

COMBAT CENTER ORDER P3500.4F

From: Commanding General
To: Distribution List

Subj: STANDING OPERATING PROCEDURES FOR RANGE/TRAINING AREAS AND AIRSPACE (SHORT
TITLE: SOP FOR RTAA)

Ref: (a) MCO P3570.1B

Encl: (1) LOCATOR SHEET

1. Purpose. To set forth administrative and operational procedures for the safe use of the Combat Center's Range/Training Areas and Airspace (RTAA).

2. Cancellation. CCO P3500.4E.

3. Background. The mission of the Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms, California, is to conduct live fire Combined Arms Exercises (CAX) for Marine Air Ground Task Forces (MAGTF's) and other major training exercises, live fire and non-live fire, as directed; to evaluate the effectiveness of FMF units and MAGTF's in command, control and coordination of combined arms; to exercise and refine existing doctrine; to develop more efficient means to accomplish FMF missions; and to examine the adequacy, currency, and adaptability of doctrine applications to cope with ongoing evolutionary changes in FMF tactics. MCAGCC conducts ten CAX's, One Fire Support Coordination Application Courses (FSCAC), and seven Tactical Air Control Party (TACP) live fire training exercises per year in support of the Marine Corps' training program. In addition to these evolutions, MCAGCC provides areas for training exercises conducted by Commander, Marine Forces, Pacific (COMMARFORPAC); Commander, Marine Forces, Atlantic (COMMARFORLANT); Commander, Marine Forces, Reserve (COMMARFORRES); and their subordinate units. The Combat Center also supports other services and government agencies for various live fire training.

4. Summary of Revision. This revision contains a substantial number of changes and must be completely reviewed.

5. Reserve Applicability. This order is applicable to the Marine Corps Reserve.

6. Certification. Reviewed and approved this date.

C. L. STANLEY

DISTRIBUTION: A-1 plus

LOCATOR SHEET

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TITLE: SOP FOR RTAA)

Location:
(Indicate the location(s) of copy(ies) of this Order.)

ENCLOSURE (1)

SOP FOR RTAA

RECORD OF CHANGES

Log completed change action as indicated.

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SOP FOR RTAA

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CHAPTER 1

GENERAL

1000. GENERAL

1. Purpose. The purpose of this Manual is to provide a detailed source document governing the commands utilizing the Range/Training Areas and Airspace (RTAA) aboard the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms. It specifies responsibilities, gives descriptions of available training ranges, provides instructions on how to schedule the RTAA, and defines safety regulations for all live fire, maneuver, and air operations at the Combat Center.

2. Applicability. All personnel engaged in firing or maneuvering in the RTA or utilizing airspace shall be familiar and will comply with the provisions of the reference and this Manual.

1001. BACKGROUND. The policies and procedures established by this Manual are based on combat, operational and training experiences as well as the safety considerations specified in the reference. They have been developed in a manner that will allow units to use the resources of the Combat Center efficiently and achieve realistic combat training while ensuring an acceptable level of safety. Training casualties are unacceptable. Safety considerations are paramount.

1. Fire and Maneuver. This Manual permits Marines training at MCAGCC to maneuver, both on foot and mounted in vehicles, through live ordnance impact areas. It further permits the use of all conventional weapons systems and most ordnance commonly found in a MAGTF to be employed per current doctrine in a combined arms setting. Most importantly, commanders are able to practice the essential combat skills of fire support coordination and fire and maneuver over the vast and challenging terrain of the Combat Center.

2. Training Safety. Despite the dangers involved in training in a live fire and maneuver environment, the Combat Center's safety record has been noteworthy since the CAX program began in October 1975. Training experience at this command validates that the doctrine of fire support coordination is safe if properly executed. This experience further reveals that deviation from doctrine is not only dangerous in combat training from a safety standpoint, but would also be dangerous in actual combat from a tactical standpoint. Units that are well schooled in the basic combat skills and techniques and are aware of current doctrine are best able to safely train in a live fire setting.

1002. DEFINITIONS

1. Range/Training Area and Airspace (RTAA). The Combat Center encompasses 932 square miles of ranges and maneuver areas, Restricted Airspace R-2501, and associated Military Operations Areas (MOAs).

2. Range/Training Areas (RTA). Includes all ranges and maneuver areas, excluding the airspace. The criteria of each numbered range is described in Appendix B and is designed to allow specific training within their established limits. A three-digit number identifies the ranges. A letter following the three-digit number also delineates ranges with additional usage criteria.

3. Airspace. The airspace over the Combat Center is a Restricted Area designated R-2501. The airspace is divided into four sectors: R-2501 North (N), R-2501 East (E), R-2501 South (S), and R-2501 West (W). These sectors are depicted on En route High Altitude and En route Low Altitude Charts and Appendix C (Combat Center Airspace Complex). The R-2501 airspace is available for scheduling from surface to 26,000 feet MSL, 24 hours a day, seven days a week. Airspace above 26,000 feet MSL is not available from 0900-1200 and 1700-2100 daily; this airspace may be available during other hours with prior coordination with the Range Scheduling Office. Additionally, the Bristol and Sundance Military Operating Areas (MOAs) are scheduled by the Combat Center.

4. Restricted Areas. Specific areas of the Combat Center, which may not be fired into and through which movement is, prohibited (Chapter 9).

5. Commanding Officer/Officer-in-Charge (CO/OIC). The senior officer located with the unit in the RTA is responsible for the overall safety of the unit.

6. Range Safety Officer (RSO). The RSO is a commissioned officer, warrant officer, or staff noncommissioned officer designated by the CO/OIC to ensure that safety regulations are enforced throughout the unit. The RSO is required to attend a Range Safety Officer Certification Course given by Range Safety.

1003. RANGE OPERATIONS

1. The Director, Operations and Training Directorate (Dir, O & T), is responsible to the Commanding General, MCAGCC, for all the training conducted in the MCAGCC RTAA.

2. Range Operations Division. The Range Operations Officer (ROO) is responsible to the Dir, O & T, for the control, scheduling, safety, and maintenance of the RTAA.

a. Range Operations Section

(1) Range Control (BEARMAT). Provides RTAA control, control of all medical evacuations (MEDEVACs), and a means of passing and receiving essential information to all commands engaged in training aboard the Combat Center.

(2) Range Scheduling. Provides a single scheduling authority for all training aboard the Combat Center's RTAA. Coordinates airspace usage with the Federal Aviation Administration (FAA) and maintains data of actual use of the RTAA.

b. Range Safety Inspectors. Responsible for the enforcement of this Manual and safety standards throughout the RTAA. Range Inspectors serve as direct representatives of the Dir, O & T, for safety issues in the RTAA, to include RSO/OIC certification, range briefs and LASER briefs .

c. Range/Training Areas Maintenance (RTAMS). Maintains all Combat Center RTAs, as well as target construction and emplacement in support of the CAX Program.

d. Explosive Ordnance Disposal Unit. Coordinates and supervises EOD support aboard MCAGCC.

Product Center 9, Defense Supply Center, Richmond Virginia (DSCR-JN) at no cost to the requester using DLA form 1832 (Jul 1999). Stock numbers are V795S29PALMEMIM (NSN 7643-01-448-6788) and V795S29PALMWMIM (NSN 7643-01-448-6791) for map size 1;50,000 and V695S29PALMMIM (NSN 7643-01-447-0678) for 1;100,000.

1005. SPEED LIMITS. The maximum speed for all vehicles operating on unpaved roads (MSRs) throughout the RTA is 30 miles per hour, conditions permitting.

1006. AUTHORIZED VEHICLES

1. Four categories of vehicles are allowed in the RTAs: tactical vehicles, non-tactical government vehicles, government leased vehicles (GSA), and government contractor's vehicles. POVs/rental cars are not authorized in any training area without written permission from the Dir, O & T.

2. Vehicles will not be authorized entry to the RTA without prior scheduling with the Range Scheduling Office and without expressed permission from BEARMAT.

3. Vehicles departing hard-surface roads en route to any RTA must meet the following minimum requirements:

- a. Radio for constant communications with BEARMAT on 49.85 FM.
- b. Four-wheel drive vehicle.
- c. Water (one 5 gallon water can per vehicle).
- d. Two persons in group (exceptions allowed with permission of Dir, O & T).

1007. SAFETY BRIEFS

1. The following briefs are required prior to conducting training at MCAGCC:

- a. Desert Survival.
- b. EOD Unexploded Ordnance.
- c. Natural Resources.
- d. Range Safety.
- e. Scrapper.
- f. Range Safety Officer Certification Course for SNCO's/Officers.

2. In order to schedule these briefs; contact the Range Control Officer at DSN 230-6454/6679 or commercial (760) 830-6454/6679.

1008. POINTS OF CONTACT. The following telephone numbers are provided for reference. All phone numbers are preceded by DSN 230 or Commercial (760) 830-XXXX.

Director, Operations and Training	7467
Operations Officer.....	6819
Assistant Operations Officer.....	6945/7447 FAX..5446
Range scheduling.....	6313.....FAX..6929
Range Control (BEARMAT).....	6623
Range Control Officer.....	6454/6679
Explosive Ordnance Disposal Unit.....	6885
Range Maintenance (RTAMS).....	6953
Range Safety.....	7112
Laser Safety.....	6576
Exercise Coordinator (CAX).....	6576.....FAX...6929
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Frequency Manager, (Comm Data Directorate).....	7141 ext 231.FAX...4198

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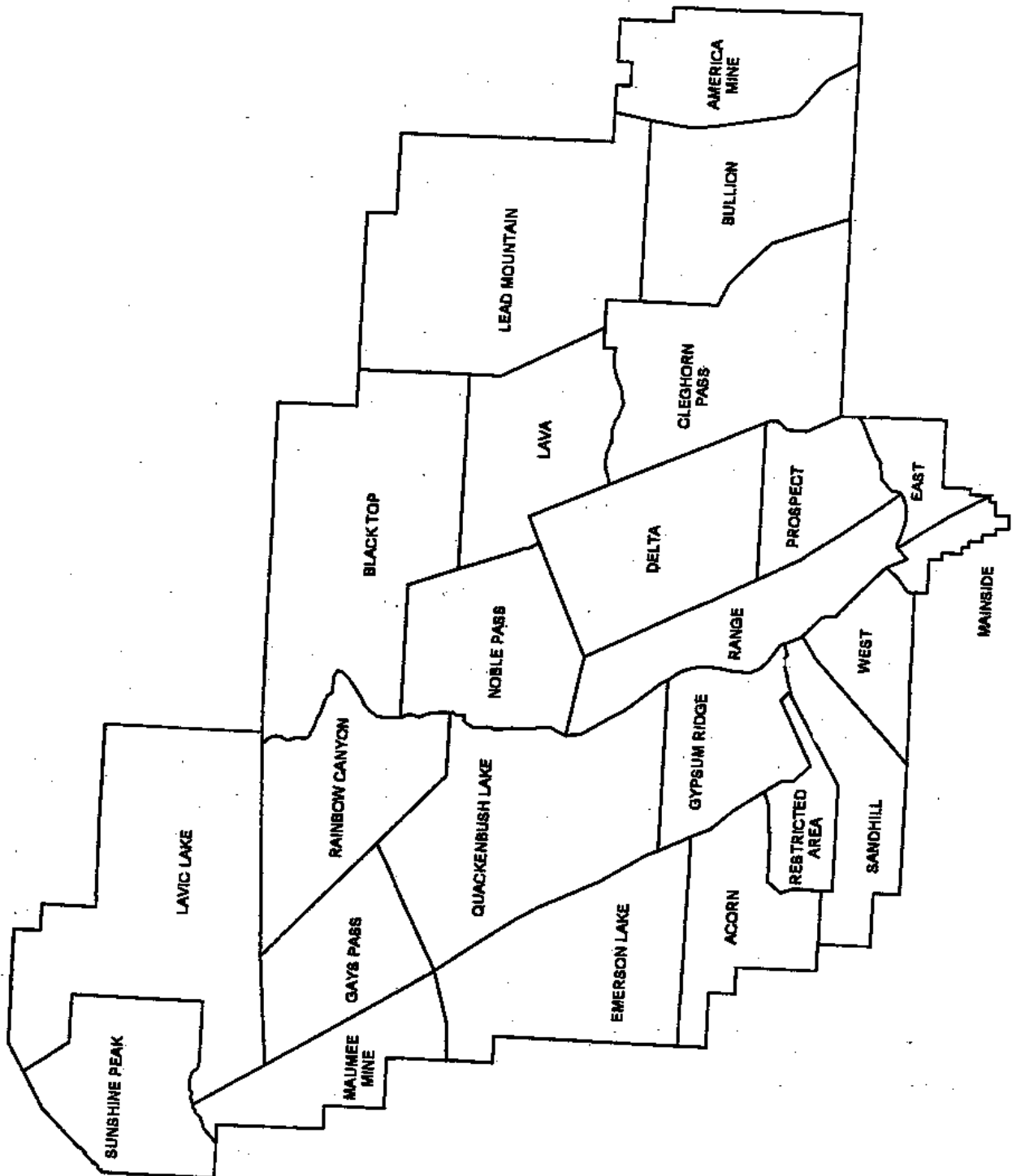


Figure 1-1, --MCAGCC RTAA

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CHAPTER 2

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CHAPTER 2

SCHEDULING

2000. RANGE SCHEDULING

1. General

a. Requests to utilize the Combat Center's RTAA must be submitted a minimum of five working days prior to the first day of use.

b. Many of the Combat Center's numbered ranges have been designed for a specific purpose and should be so utilized. The Range Scheduling Officer may approve (by exception) alternate uses of the numbered ranges.

2. Scheduling Priorities. The formal CAX Program has priority aboard MCAGCC (MCO 3500.11D states that the mission of MCAGCC is to conduct a Combined Arms program (CAX)). All other training is scheduled on a "first come, first served" basis. Other activities, which may affect scheduling priorities, are:

- a. Real world contingencies.
- b. Range maintenance.
- c. EOD clearance operations.
- d. Those directed by the Commanding General, MCAGCC.

NOTE: UNITS ARE ADVISED THAT THESE CIRCUMSTANCES MAY TAKE PRIORITY OVER PREVIOUSLY APPROVED RANGE REQUESTS.

3. CAX Scheduling. Provisions for scheduling CAX related training may be found in Chapter 8.

4. Scheduling Procedures. RTAAs may be scheduled by the following methods:

a. Range Facility Management Support System (RFMSS)

- (1) Local Area Network.
- (2) Dial-in modem.

b. Message Text Format (MTF) or FAX including the following information: unit, range/RTA, time/date, type weapons, type ordnance, time hot, number of personnel, number of vehicles, identify RSO, POC, and phone numbers.

5. Joint Use Training. Joint usage, or "piggy-backing", of specific numbered ranges and RTAs may be authorized by Range Scheduling under certain circumstances and with concurrence of the unit already scheduled. However, the Range Scheduling Officer, under the cognizance of the Dir, O & T, shall retain final authority in assigning all training areas aboard the Combat Center. IF A UNIT DOES NOT APPEAR ON THE DAILY RANGE TRAINING SCHEDULE, BEARMAT WILL NOT ALLOW THEM TO ENTER THE RTAA.

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6. Exercise Coordinator. During any large scale exercise, the Officer Conducting the Exercise (OCE) will assign an Exercise Coordinator. The primary functions of the coordinator are to handle scheduling requests from the exercise force and to serve as a point of contact between the exercise force and the Combat Center in order to reconcile any problems that arise.

2001. RANGE CANCELLATIONS

1. Cancellation Procedures. Ranges may be canceled in the following manner:

a. Resident Units. Telephonically with written follow up (ext. 6454/6313).

b. Nonresident Units. Cancel via message, FAX, or LAN (RFMSS).

2. Confirmation. Cancellation of ranges is not effective until written notification is received by Range Scheduling.

3. Range Occupation. Units have one hour beyond the scheduled start time to occupy a range. If the range has not been occupied after one hour, the range will be canceled. Notify Range Scheduling (during working hours) or BEARMAT (after working hours) of any unexpected delays.

NOTE: NUMBERED RANGES AND CONTRACTOR RUN RANGES (103, 107, 108, 109, 113, and 500) MUST BE CANCELED AT THE EARLIEST POSSIBLE TIME.

2002. RANGE CONFLICTS

1. Training Conflicts. The Range Scheduling Officer will resolve all range scheduling conflicts per paragraph 2000.2 above and the following procedures:

a. Time of receipt of the range requests.

b. Scheduled operational commitments.

c. Whether joint usage can be conducted safely. If so, one unit will be designated as primary user and all others as secondary users for that RTA.

2. CAX. During a CAX evolution, units not participating in the exercise may schedule ranges.

2003. RANGE SCHEDULING RESTRICTIONS

1. Automated ranges. Range 500 is limited to one 16 hour block of time per day, with every seventh day reserved for maintenance. All other automated ranges are limited to one eight hour block per day. A minimum of 48 hours notice must be given Range Scheduling to schedule, cancel, or change times on automated ranges.

2. 400 Series Ranges. During a CAX evolution, only units participating in the CAX may use the 400 Series Ranges. All other times, the 400 series ranges may be scheduled with a minimum of one day between units to allow for a police of the range, rebuilding of trench lines and EOD clearance (paragraph 6003).

3. Range 500 (Multi-Purpose Range Complex). Scheduled on an annual basis for resident commands. Normal scheduling includes six firing days followed by one day of maintenance (two maintenance days required between separate commands).

2004. TRAINING UTILIZATION REPORT. Units are required to submit a Training Utilization Report (Figure 2-1) to Range Scheduling upon the completion of live fire within three working days.

2005. SCHEDULING EXCLUSIVE USE OF RTAA

1. Exclusive Use of RTAA. Under certain circumstances, units may request permission to assume control of portions of the R-2501 from BEARMAT during large scale exercises. Permission from the Dir, O & T, is required. The OCE must submit a request to the Range Scheduling Officer a minimum of 90 days prior to the exercise and provide the following information:

- a. Concept of Operations. A description to envision specific usage of the entire RTAA.
- b. A breakdown of activity dates from arrival to range police and departure.
- c. Participating units and higher headquarters (HHQ) coordinator.
- d. Waivers required per the reference and this Manual.
- e. Identification of a Direct Air Support Center (DASC) for airspace control.
- f. Acknowledgment of the requirement to assign a dedicated Exercise Coordinator by name and billet (paragraph 2000.6).
- g. A minimum 72-hour period for dedicated range police.
- h. A dedicated MEDEVAC helicopter in support of the exercise to be stationed aboard the Combat Center.

NOTE: PREVIOUSLY SCHEDULED UNITS RETAIN THEIR PRIORITY ON SCHEDULED RANGES AND AIRSPACE. THE EXERCISE HHQ WILL BE RESPONSIBLE FOR MEETING THE UNIT TRAINING REQUIREMENTS EVEN THOUGH PASSAGE OF CONTROL MAY HAVE TAKEN PLACE WITH BEARMAT.

2. Exceptions

a. MCAGCC will retain control and coordination of the numbered ranges and non-live fire RTAs Acorn, East, West, Sand Hill, and Gypsum Ridge to support resident command training.

b. BEARMAT will retain overall control of the R-2501 complex at all times. Control of airspace 26,000 feet MSL and below may be passed to a DASC. Advanced coordination with Range Scheduling is required for requests to utilize altitudes greater than 26,000.

3. Airspace Coordination Meeting. An Airspace Coordination Meeting with BEARMAT must be scheduled by the exercise force prior to the first flight in support of the exercise. At a minimum, the meeting should include representatives from the Ground Combat Element (Range Control) and Air Combat Element (DASC). All elements of the Checklist for Passage of Control of the R-2501 contained in Appendix J must be met.

2006. BUREAU OF LAND MANAGEMENT ACCESS. Bureau of Land Management (BLM) access is required whenever a unit enters a RTA from off base. Approval for access

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must be provided by the Director, O & T and the Director, NREA. Requests will be prepared using access form found in Figure 2-2. Forms will be submitted with range requests and not less than five (5) working days prior to use.

2007, SURFACE DANGER ZONE DIAGRAMS (SDZs). Units participating in (Non-CAX events) will provide SDZs for live fire training events using the form contained in Figure 2-3. Forms will be turned into Range Safety prior to going to field.

2008. RISK MANAGEMENT The Risk Management Process, described in FM 100-14, FM 25-101, FM 101-5, and MCO 3500.27 will be used to manage risks during training. Units using ranges will employ Risk Management procedures to identify operational hazards and implement appropriate controls in order to minimize training mission risk. Formal risk management documentation is required on major training exercises.

a. Apply the Risk Management process to range training as follows:

(1) Identify hazards for the training mission. The first step in the 5-step Risk Management process must use the METT-T framework and focus on fratricide prevention as well as training value. (See figure 2-4)

(2) Reduce risks to an acceptable level. All residual risks (risks that remain after controls have been developed and implemented) are accepted by the appropriate level of authority.

(3) Adhere to the restrictions and requirements established in this manual and appropriate directives.

(4) Planning for any live fire training exercise or firing of any weapon system will consider the purpose of the firing, available terrain, atmospheric conditions, ballistic data, availability of required safety equipment and environmental impact.

b. When application of the Risk Management process involves a waiver; submit the request for the waiver per para 3017 of this manual.

c. A Risk Assessment Matrix can be used to accomplish the second step of risk management. The elements needed to establish a Risk Assessment Code (RAC) are:

(1) Hazard Severity - An assessment of the worst credible consequence, which can occur as a result of a hazard.

(a) Category I - The hazard may cause death, loss of facility/asset or result in grave damage to national interests.

(b) Category II - The hazard may cause severe injury, illness, property damage, damage to national or service interests or degradation to efficient use of assets.

(c) Category III - The hazard may cause minor injury, illness, property damage, damage to national, service or command interests or degradation to efficient use of assets.

(d) Category IV - The hazard presents a minimal threat to personnel safety or health, property, national, service or command interests or efficient use of assets.

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(2) Mishap Probability - The probability that a hazard will result in a mishap or loss, based on an assessment of such factors as location, exposure, (cycles or hours of operation), affected populations, experience or previously established statistical information. Mishap probability will be assigned an English letter according to the following criteria:

(a) Sub-category A - Likely to occur immediately or within a short period of time. Expected to occur frequently to an individual item or person or continuously to a fleet, inventory or group.

(b) Sub-category B - Probably will occur in time. Expected to occur several times to an individual item or person or frequently to a fleet, inventory or group.

(c) Sub-category C - May occur in time. Can reasonably be expected to occur some time to an individual item or person or several times to a fleet, inventory or group.

(d) Sub-category D - Unlikely to occur.

(3) Risk Assessment Code (RAC) - The RAC is an expression of risk, which combines the elements of hazard severity and mishap probability. Using the matrix shown below the RAC is expressed as a single Arabic number that can be used to help determine hazard abatement priorities.

RAC Definition:

- (1) Critical
- (2) Serious
- (3) Moderate
- (4) Minor
- (5) Negligible

Hazard Severity	Mishap Probability			
	A	B	C	D
I	1	1	2	3
II	1	2	3	4
III	2	3	4	5
IV	3	4	5	5

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TRAINING UTILIZATION REPORT

UNIT: _____

RANGE/TRAINING AREA: _____

DATE: _____

TYPE OF WEAPONS: _____

ORDNANCE EXPENDED BY TYPE AND QUANTITY:

_____	=	_____
_____	=	_____
_____	=	_____
_____	=	_____
_____	=	_____

GRID COORDINATES OF IMPACT AREA(S):

UPPER LEFT LATERAL LIMIT _____

UPPER RIGHT LATERAL LIMIT _____

LOWER LEFT LATERAL LIMIT _____

LOWER RIGHT LATERAL LIMIT _____

Other coordinates needed to complete irregular impact areas:

POSSIBLE LOCATION OF ANY DUDS BY GRID: _____

NUMBER OF PERSONNEL TRAINED:

OFFICERS: _____

ENLISTED: _____

NOTE: TURN THIS REPORT INTO RANGE SCHEDULING/RANGE SAFETY WITHIN THREE WORKING DAYS UPON COMPLETION OF TRAINING.

Figure 2-1, --Training Utilization Report

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ACCESSING MCAGCC TRAINING RANGES
THROUGH BLM LAND

The following information must be provided to the Head, NREA via the Director, O&T by any unit, contractor, or other authorized personnel requesting access to MCAGCC training ranges through BLM land:

UNIT/ORGANIZATION: _____

POC/TEL NR: _____

NUMBER AND TYPE OF VEHICLE(S): _____

NUMBER OF PERSONNEL: _____

REASON FOR ACCESS: _____

ACCESS LOCATION (GRID): _____

TIME/DATE OF ACCESS/EGRESS: _____

LOCATION IN TRAINING AREA (GRID): _____

MAP (SHOWING ROUTE AND POSITION): _____

NOTE: The following information must be adhered to while accessing/egressing BLM land:

1. Wheeled vehicles/pedestrian traffic only.
2. Speed not to exceed 25 MPH.
3. No tactical maneuver on BLM land. Lights must be used at night.
4. No cross country travel. Access MUST be over established roads.
5. Report any observed unexploded ordnance to BEARMAT ASAP. Mark accordingly.
6. Be observant to the presence of animals, especially the federally listed threatened species, desert tortoise. If a tortoise is crossing the road, allow it to cross before proceeding. To avoid unnecessary damage to the terrain, do not negotiate vehicles around the tortoise.
7. All off base access must be pre-approved by the Dir O&T and the Head, NREA.

Director, O&T

Date

Head, NREA

Date

Figure 2-2.--BLM ACCESS FORM

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UNIT: _____

Training Area(s): _____

Dates of training: _____

Weapons: _____

Firing Point(s) (1) _____ (2) _____ (3) _____ (4) _____

Impact Area Point (1) _____

(2) _____

(3) _____

Provide to BEARMAT (Range Control) SDZ scale 1:100,000 for plotting prior to going to field.

POC: _____ RSO: _____ Phone: _____

Figure 2-3,--Surface Danger Zone Worksheet

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Categories	Hazards	Causes	RAC
Mission			
Enemy	SALUTE		
	DRAW-D		
Terrain & Weather	Terrain		
	Visibility		
	Time of Day		
	Temperature		
Troops	Training		
	Physical Condition		
	Morale		
Fire Support	Type Support		
	Range/RTA		
	Control Measures		
Time	Planning		
	Rehearsals		
	Movement/Execution		
Space			
Logistics			

Figure 2-4,...Risk Management Form, METT-T

Notes: (1) This form must be submitted along with finalized risk assessment anytime a unit requests a waiver for training.

(2) Unit generated (locally produced) forms may be submitted to clarify any information not contained on the METT-T form.

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CHAPTER 3

SAFETY

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CHAPTER 3

SAFETY

3000. GENERAL

1. The reference establishes policies and procedures for conducting live fire training and is directive in nature for all training aboard the Combat Center. Units are required to review and strictly adhere to these guidelines unless appropriate written waivers (paragraph 3017) have been approved by the Commanding General, MCAGCC, or as the reference otherwise allows.
2. Commanders are responsible for safety and must adhere to the spirit and intent of this Manual and the reference.
3. RTAA Access. All entry into the RTAA is controlled through Range Control (BEARMAT).
 - a. Units requesting entry to their training area must receive clearance from BEARMAT.
 - b. Vehicles will be equipped with a VHF/FM radio for communications with BEARMAT on 49.85. When vehicles convoy, only one radio maintaining communications with BEARMAT is required.
 - c. Any unit that has a route(s) that will affect any other unit will contact the affected unit(s) and coordinate its movement.
 - d. The Range Control Officer (ext. 6645) is available to assist with this coordination.

3001. COMMAND SAFETY RESPONSIBILITIES

1. Commanding General, MCAGCC. The CG, MCAGCC is responsible for:
 - a. Formulation of safety regulations and procedures to be followed in the RTAA.
 - b. Promulgating and ensuring that safety standards are enforced.
2. Officer Scheduling the Exercise (OSE). The OSE is the senior officer of the command from which the exercise force is drawn. Prior to the exercise force's deployment to the Combat Center, the OSE is responsible for ensuring:
 - a. The exercise force is familiar with the reference, this Manual, and safety regulations unique to the units involved.
 - b. Emergency procedures for heat casualties.
 - c. Procedures for initiating search and rescue of missing personnel.
 - d. That pre-deployment desert survival briefings for all exercise force members are conducted (paragraph 1007).

e. Requests for waivers (paragraph 3017) or changes to these safety regulations will be forwarded to the CG, MCAGCC for approval or resolution. After the exercise force has deployed to the Combat Center, the primary responsibility for the enforcement of these safety regulations rests with the OCE.

3. Officer Conducting the Exercise (OCE). The OCE is designated by the OSE. The OCE is:

a. The senior officer who is in command of the entire exercise force, when the exercise force is deployed to the Combat Center.

b. Responsible to the CG, MCAGCC for overall safety of the exercise force during the conduct of the exercise.

c. Responsible for assigning an Exercise Coordinator.

d. Responsible for the assignment of roadguards and air sentries (paragraph 3002).

e. Responsible for conducting weapons safety checks. Specifically, upon the completion of every live fire evolution, each unit participating in live fire will ensure all weapons are safe and clear.

4. CO/OIC of the Firing Element. The CO/OIC of a firing element is responsible to the OCE for ensuring that:

a. Action taken by their units are in compliance with applicable safety regulations and policies.

b. Personnel are given sufficient data to perform their mission. This data will include, but is not limited to the following type information:

(1) Range Cards (Delineate Limits of Assigned Ranges).

(2) Safety Cards (Delineate Limits of Fire).

(3) Misfire and Hang Fire Procedures.

(4) Disposition of Unserviceable Ordnance.

(5) Emergency Procedures in case of injury.

(6) Cease Fire Procedures.

c. Additional safety supervisory personnel are assigned within their unit as necessary to comply with the reference, this Manual, the unit's SOP, and the exercise force's Safety Regulations. Examples would be:

(1) Position safety officers.

(2) Piece Safety NCO.

(3) Live fire safety personnel.

(4) Aviation safety officer.

(5) Range Safety Officer (SNCO/WO/Officer).

3002. RANGE SAFETY OFFICER (RSO)

1. GENERAL. The designated RSO will attend the MCAGCC RSO Certification Program and be thoroughly familiar with the contents of the reference and this Manual. Additionally, the RSO will be knowledgeable of those FMs/TMs, which address the particular training conducted, and weapons being fired.

2. ORDERS. The following orders/duties are applicable to the RSO when supervising safety responsibilities in the RTAA:

a. RTAs

(1) Roadguards

(a) The RSO is directly responsible to the CG, MCAGCC, for the proper employment of range roadguards. The RSO shall ensure the proper coordination, instruction and positioning of roadguards assigned throughout the RTA.

(b) At a minimum, roadguards shall:

- Be posted in pairs.
- Have positive two-way communications with the RSO.
- Have their positions recorded by grid location with the RSO.
- Have a five gallon water can if separated from other Marines.
- Restrict access to RTAs by unauthorized personnel.
- Clear the access of personnel into the RTAs with the RSO.

(2) Ensure that all range guards have adequate communications with the RSO. Range guards will keep the RSO informed of all oncoming traffic. The RSO will inform the OIC of firing so that appropriate determination is made to allow traffic entry into, or safe passage through, the live fire RTA.

(3) Ensure the posting of air sentries with communications at the firing positions of indirect fire weapons.

(4) Request permission from BEARMAT to commence live fire.

(5) Be present during all live firing. Be able to observe the aspects of all weapons being fired. If a good vantage point is not available, be able to periodically check all weapons.

(6) Ensure that a corpsman and dedicated emergency vehicle with driver are present at the firing position.

(7) In the event of an emergency situation/accident, the RSO will inform the Range Operations Officer via BEARMAT during working hours, or the CDO via BEARMAT after working hours.

(8) Be familiar with MEDEVAC procedures (paragraph 3006).

(9) In addition to the above specific orders, be knowledgeable of all aspects of safety concerning the type of fire being conducted. Information concerning requirements and/or restrictions unique to the Combat Center are available from Range Safety.

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(10) Ensure communications are maintained with BEARMAT at all times. In the event of a communications failure, secure all firing until communications are restored.

(11) Ensure that upon the completion of live fire, all weapons shall be checked safe and clear. Contact BEARMAT to report weapons safe and clear before departing the RTA.

(12) Report to Bearmat the number and type of munitions expended.

b. Numbered Ranges

(1) The same procedures as in the RTAs.

(2) The RSO will be met at the entrance to the range by a representative of the Range Safety Office and will be issued a red range flag and a copy of the Range SOP. This flag will be raised prior to commencement of firing and lowered after informing BEARMAT of the intent to cease live fire.

(3) When multiple units are using the same range, the RSO will ensure that individuals are cognizant of all training being conducted. Additionally, the RSO is responsible for deconflicting all range fans, impact areas, and target areas.

(4) Upon completion of live fire, all weapons shall be checked safe and clear. Contact BEARMAT to report weapons safe and clear before departing the range.

(5) Complete an Ammunition Expenditure Report.

3003. RANGE VIOLATIONS. Infractions of this Manual will result in the issuance of a Range Violation. Range Operations personnel, primarily Range Safety Inspectors, are the issuing agents for these violations. In the event of a violation, all training may be halted until corrective action has been taken.

3004. OVERHEAD FIRE (PROTECTED OR UNPROTECTED TROOPS)

1. Overhead fire will be conducted in strict adherence to paragraph 16-4 of the reference. Units participating in non-TTECG controlled events will be guided by MCO 3570.1B and Appendixes M and N.

2. Overhead fire is authorized only with ground mounted 7.62mm and .50 caliber machine guns on tripods. The following precautions must be observed when providing overhead fire:

a. Firing is conducted from firing positions, which are designated by the unit commander and provide an unobstructed field of fire to the target.

b. Positive stops are provided to limit the T & E, and depression of weapons during firing. Machine guns shall be fired using tripod and T & E. Definite limits for elevation, depression, and traversing will be assigned to gun crews to ensure that the fire stays within the assigned sectors and is safe relative to maneuver units. Swinging traverse or free gun shall not be employed. A safe limit for depression shall be assigned once the gun is test fired and determined safe for

overhead fire. Under no circumstances will the muzzle be depressed below that limit.

c. Rate of fire does not exceed 70 rounds per minute for 7.62mm and 40 rounds per minute for .50 caliber machine guns.

d. The weapon is test fired prior to delivery of overhead fire.

e. The lines of fire of guns do not intersect.

f. The mounts and weapons are inspected by unit leaders and declared safe for overhead fire.

g. Tracer ammunition may be used for overhead fire.

3. Overhead fire of indirect fire weapons is limited to artillery up to 155mm. All components of the round must be cleared for overhead fire per the reference. Any deviation from this policy requires a CG, MCAGCC waiver.

4. In addition to the communications requirements listed in Chapter 4, units must have doctrinal communication nets established in order to control fire and maneuver. There must be clear, positive, redundant signals to cease and/or to shift fires.

3005. EMPLOYMENT OF ARMORED VEHICLES (TANKS, AAVs, OR LAVs)

1. When armored vehicles are employed in support of an infantry element or when infantry elements are employed in support of armored vehicle elements, the responsibility for safety rests with the supported commander. The supported commander will establish effective command and control procedures with the supporting unit commander to ensure safety of personnel operating on and around armored vehicles.

2. The following areas will be addressed in establishing positive command and control between infantry and vehicle elements:

a. Procedures to alert the infantry personnel prior to firing tank ammunition.

b. Procedures for passage of vehicles through infantry lines.

c. The positioning of infantry around vehicles.

d. Tank or LAV main gun armament shall not be loaded or fired during movement of the tank or LAV, except as specifically authorized.

e. Lay on target with main gun armament shall be accomplished before firing.

f. AAVs will not activate the electronic turret motor to fire the machine gun when infantry are deployed in the area. The manual control will be utilized when personnel are within effective machine gun range.

3. Guards will be posted to protect sleeping personnel when armored vehicles are operating during the hours of darkness.

4. Protective body armor and headgear shall be worn at all times when riding in vehicles.

5. Normal distance between stopped or parked vehicles in the field will be one vehicle length/width apart, except at stationary tank ranges where insufficient space is available. Personnel will not walk, stand, or operate a wheeled vehicle between two armored vehicles, when the engine of one or both is running.
6. Vehicles will have a ground guide when moving in an assembly area, bivouac area, or motor park. During periods of decreased visibility all ground guides will be equipped with a portable light source.
7. No vehicle will be moved in reverse during tactical training unless the vehicle commander is looking to the rear and can adequately observe the area to the rear of the vehicle. Any time a vehicle is moved in reverse during darkness, there will be ground guides both at the front and rear of the vehicle, standing to the side, and not directly in the path of the vehicle. No vehicle will be moved during tactical training unless the vehicle is in moving voice communication with the driver. When the vehicle is moving under the direction of ground guide, the guide will walk facing forward in the direction of movement.
8. Vehicle ramps shall not be lowered until the area to the rear of the vehicle has been checked and cleared. The ramps will not be closed until all personnel have been alerted and the ramp cleared.
9. Armored vehicles shall be operated with at least one hatch locked open except when engaged in those phases of tactical and firing exercises in which it would be necessary to close all hatches for proper training and to prevent injuries from live fire. In either the opened or closed position, all hatches will be checked to ensure that they are securely locked. On moving tank ranges, the driver's hatch will be closed during firing. During these short periods of buttoned up operation, vehicle commanders will ensure that:
 - a. The blower is turned on.
 - b. Engine bulkhead covers and fuel shutoff valve cover plates are fastened securely.
10. Vehicles with inter-phone communication may not move until communication is established between the driver and the vehicle commander.
11. Vehicles equipped with a smoke grenade launcher system (i.e., tanks, AAVs and LAVs) shall observe the safety diagrams shown in reference (a). Firing vehicles must button-up prior to firing the grenades and unprotected personnel are not permitted to occupy terrain within the Surface Danger Zone (SDZ) .

NOTE: DUE TO THE VARIETY OF USES FOR SMOKE IN FIRE AND MANEUVER EXERCISES, CONFUSION OCCASIONALLY EXISTS REGARDING THE PURPOSE FOR SPECIFIC SMOKE OR WHITE PHOSPHOROUS (WP) MISSIONS. SINCE WHITE SMOKE OR WP ARE THE MOST COMMON MEANS OF DESIGNATING TARGETS FOR FIXED WING CLOSE AIR SUPPORT (FWCAS) OR ROTARY WING CLOSE AIR SUPPORT (RWCAS) MISSIONS, A POTENTIAL DANGER EXISTS WHEN FWCAS/RWCAS IS BEING EMPLOYED WITH MANEUVERING TROOPS AND EQUIPMENT IN LIVE FIRE TRAINING. SMOKE WHICH IS USED TO SCREEN MOVEMENTS FROM ENEMY OBSERVATION (SELF-SCREENING SMOKE) IS PROVIDED BY SEVERAL MEANS FOR USE BY VEHICLES AND PERSONNEL. IT IS NORMALLY PROVIDED IN CLOSE PROXIMITY TO MANEUVER ELEMENTS AND CAN EASILY BE MISTAKEN FOR TARGET MARKING SMOKE IF NOT PROPERLY COORDINATED. TO PRECLUDE TRAINING ACCIDENTS WHICH WOULD RESULT FROM AN ATTACK AIRCRAFT MISTAKING SELF-SCREENING SMOKE WITH A

TARGET MARK, THE USE OF SELF-SCREENING SMOKE DURING A CAX OR OTHER COMBINED ARMS TRAINING MUST BE APPROVED BY THE FIRE SUPPORT COORDINATOR (FSC) AND THE SENIOR TTECG MANEUVER REPRESENTATIVE (DURING TTECG CONTROLLED EVENTS). PRIOR TO ISSUING APPROVAL, THE FSC WILL ENSURE THERE IS NO SAFETY CONFLICT WITH ACTIVE FWCAS OR RWCAS MISSION(S). FOR THE PURPOSE OF THIS MANUAL, "SELF-SCREENING SMOKE" INCLUDES TANK SMOKE GRENADE LAUNCHERS, SMOKE GENERATION, AND HAND THROWN HC SMOKE GRENADES.

3006. MEDICAL EVACUATION (MEDEVAC) PROCEDURES

1. General

a. A dedicated MEDEVAC aircraft is required to be stationed aboard the Combat Center during all live fire operations (live fire operations are allowed at Ranges 100 through 106 without MEDEVAC support due to their ready access to Mainside).

b. The MEDEVAC crew must remain Mainside and maintain communications with BEARMAT (ext. 6535/6623) at all times. The Combat Center Duty Officer (ext. 7200) or the Range Control Officer will be notified if BEARMAT cannot be contacted.

c. The MEDEVAC aircraft shall be positioned at LZ-10 aboard the Combat Center when not airborne.

d. MEDEVAC crew will operate under a 30 minute alert, defined as the aircraft being airborne within 30 minutes from first notification of a medical emergency.

f. The MEDEVAC aircraft shall not be used for any other missions without the permission of the Director, Operations and Training.

2. Launch Authority

a. In the event of an actual MEDEVAC, BEARMAT has launch authority over the MEDEVAC helicopter.

b. In the event of a downed aircraft, BEARMAT has the authority to launch the MEDEVAC helicopter to conduct immediate search and rescue operations.

3. Cease Fire Procedures. When an actual MEDEVAC occurs all live firing at the Combat Center, except that noted in paragraph 3006.1A above, shall cease. Firing may commence when the casualty has been removed from the MEDEVAC helicopter at LZ-16 (Naval Hospital LZ). If the MEDEVAC helicopter is required to leave the Combat Center, firing may not commence until the MEDEVAC helicopter returns or until another aircraft assumes dedicated MEDEVAC duties.

4. Actual MEDEVAC Procedures

a. The responsibility for determining the necessity for medical evacuation from the field to the Naval Hospital rests with the CO/OIC based upon advice of medical personnel present. The method of evacuation (ground or air) shall also be determined by the CO/OIC. Evacuation of all casualties will be accomplished as expeditiously as possible consistent with safety and the medical status of the casualty.

b. If a MEDEVAC is required, BEARMAT shall be notified immediately. BEARMAT assume control of all actual MEDEVACs (both ground and air) aboard the Combat Center, regardless of what agency currently has control of the RTAA. The Crew Chief on duty at BEARMAT shall determine if there is a suitable helicopter available to be

diverted or if it is necessary to launch the dedicated MEDEVAC helicopter.

5. The following information should be made available as soon as possible in a MEDEVAC situation:

- a. Victim's name;
- b. Rank;
- c. Social Security Number;
- d. Type of Injury;
- e. Source of Injury;
- f. Unit;
- g. Grid coordinate of victim;
- h. Is a corpsman on the scene?;
- I. Next of Kin information;
- j. Type of MEDEVAC transportation used (helo or ground).

3007. SEARCH AND RESCUE (SAR). The Dir, O & T is designated as the Search and Rescue (SAR) Control Officer. It is anticipated that a majority of units training at MCAGCC will have the organic assets (Aircraft/Personnel) to conduct SAR operations. Upon notification of a missing individual, contact BEARMAT (VHF 49.85) by radio or PMO (ext.6800) immediately so they can standby to assist.

1. Unit will conduct initial search, ensuring the site the individual was last seen is protected.
2. Any SAR effort, which requires entry into the RTA will be coordinated with the RCO before the entry, is made. This policy also extends to civilian SAR efforts.
3. If the unit is unable to locate the missing person and a need for help from MCAGCC is required, contact the Dir, O & T who will take appropriate action per CCO 3120.7.
4. The following information should be made available as soon as possible:
 - a. Name;
 - b. Rank;
 - c. Social Security Number;
 - d. Time Last Seen;
 - e. Grid Coordinate of location Last Seen;
 - f. Water;
 - g. Equipment;

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- h. State of Mind;
- i. Unit;
- j. Next of Kin information.

3008. UNEXPLODED ORDNANCE (UXO)

1. Unexploded Ordnance Brief. All personnel scheduled to train at the Combat Center shall receive an Unexploded Ordnance (UXO) Brief by Combat Center Explosive Ordnance Demolition (EOD) personnel prior to commencement of training. This brief is good for 12 months from the date received. Units will provide a by name roster of all personnel attending the EOD brief.
2. EOD Section. EOD can be contacted at DSN 230-6885/7215 or through BEARMAT (ext. 6623 or by radio freq. 49.85), 24 hours a day, seven days a week. Contact AWH may also be made by contacting the Fire Department (6871) after working hours.
3. UXO. UXO shall not be destroyed, moved, or tampered with in any manner by anyone other than EOD personnel. UXO can be found throughout the Combat Center's RTA and are extremely dangerous. Units will report and conspicuously mark the location of any known UXO.
4. UXO Marking. EOD, TTECG, Range Safety, and Range Maintenance occasionally mark the presence of known unexploded ordnance. UXO is marked utilizing red/orange bicycle flags and will be destroyed by EOD personnel at the first opportunity. The removal or tampering with these flags by anyone other than EOD personnel is forbidden.

3009. CEASE FIRE PROCEDURES

1. Cease Fire. Any person observing an unsafe or potentially unsafe condition will stop live fire by transmitting "CEASE FIRE" to their controlling agency.
2. Termination of Cease Fire. The person who announces the cease fire is the only person who can determine that the unsafe condition has been eliminated. That person should terminate the cease fire by advising the controlling agency immediately upon resolution of the problem. The controlling agency will coordinate the resumption of all fires.
3. Terminology. The term "CHECK FIRING" is used internally in an artillery firing battery. "CHECK FIRING" should not be used to stop live fire when an unsafe or potentially unsafe condition arises. The correct term external to artillery firing batteries is "CEASE FIRE."
4. Emergency Discontinuation of an Exercise. The phrase "EMERGENCY: STOP EXERCISE" transmitted by any means shall cause an immediate halt of the exercise by all participants. In this event, all stations will maintain guard on communications channels to handle traffic pertaining to the emergency. Any emergency discontinuation of the exercise will be reported to the OCE immediately. Resumption of the exercise will be promulgated by the OCE through exercise control communications channels. This "EMERGENCY: STOP EXERCISE" command must not be issued indiscriminately; life and/or equipment must be in clear and imminent danger to cause this "last resort" command to be issued.

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5. Pyrotechnics

a. Red pyrotechnics (smoke, flares, etc.) are to be used to indicate "EMERGENCY: stop exercise" and "stop firing." They will be used by exercise units when continuation of movement of firing poses an immediate threat to the safety of personnel or equipment and immediate discontinuation is required. .

b. All other pyrotechnics may vary in meaning from unit to unit but must be specifically defined in each unit's operation order.

3010. HANGFIRE/MISFIRE PROCEDURES. Hangfire & misfire procedures will be per unit SOP and appropriate TMs. Units are responsible for performing all appropriate hangfire/misfire procedures prior to contacting EOD.

3011. HELMETS AND BODY ARMOR. The use of helmets and body armor is required whenever riding in a tactical vehicle or when live fire is being conducted and/or high explosives are being utilized. The only exceptions are: personnel who are moving vehicles around a maintenance lot (such as EEAP) in the normal course of their duties. All requests for waivers will be forwarded to the Dir, O & T for consideration.

3012. EAR PROTECTION. OPNAVINST 5100.23B requires that all personnel exposed to gunfire in training or test situations will wear ear protection devices regardless of the length of exposure. In addition, it requires that all personnel exposed to artillery fire under any circumstances will wear ear protection devices. Approved hearing protection devices will be worn by all personnel involved in live fire exercises at the Combat Center.

3013. HEAT CONDITIONS/DESTRUCTIVE WEATHER.

1. Heat Conditions. MCO 6200.1 outlines heat conditions and establishes periods when strenuous outdoors physical activities are to be curtailed. The following heat stress information is provided for training aboard the Combat Center:

a. Heat stress conditions are established by using the Wet Bulb Globe Temperature (WBGT) Index. This Index combines shade, air temperature, radiation, humidity, and wind into a single value to be used as a guide for outdoor activity.

b. When the WBGT Index is measured and a hazardous heat stress condition is established, all units training in the RTA will be notified by BEARMAT (49.85) of the heat condition. Heat stress conditions serve as a good general guide to the unit commander. However, significant differences in stress conditions may exist between measuring stations and the units operating area.

c. The WBGT Index and related categories are excellent guides for planning activities. However, heat injuries may occur to individuals with certain medical problems when the WBGT Index is below 80 degrees (F). On-site assessments must be made. Insure adequate water and dietary intake.

d. The following heat conditions, associated flags and allowable activities for each condition are as follows:

- (1) Green Flag. Heat Condition I - when the WBGT Index reads from 82 to 84.9 degrees F, heavy exercises for unacclimated personnel should be conducted with caution and under constant supervision.

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(2) Yellow Flag. Heat Condition II - when the WBGT Index reads from 85 to 87.9 degrees F, strenuous exercises, such as marching at standard cadence, should be suspended for unacclimated troops in their first two (2) or three (3) weeks. Outdoor classes in the sun are to be avoided.

(3) Red Flag. Heat Condition III - when the WBGT Index reads from 88 to 89.9 degrees F, all physical training should be halted for those troops who have not become thoroughly acclimated by at least 12 weeks of living and working in the area. Those troops who are thoroughly acclimated may carry on limited activity not to exceed six (6) hours per day.

(4) Black Flag. Heat Condition IV - when the WBGT Index exceeds 90 degrees F, strenuous activity should be halted for all troops.

e. The Heat Conditions will be passed over the RTA safety net (49.85) every time there is a change in the condition.

f. Wearing of body armor or NBC Warfare Protective Clothing in effect adds 10 degrees F to the measured WBGT Index. Heat conditions should be adjusted accordingly.

2. Destructive Weather/Wind Warnings. All thunderstorms and wind warnings will be passed on by BEARMAT (49.85) to all units training aboard the Combat Center. Each unit is required to acknowledge the receipt of the warning by obtaining a radio check with BEARMAT. Conditions are as follows:

a. Thunder Storm Advisory. Thunder Storms occurring or are forecasted to occur in the local area. Lightening and hail may be a hazard to aircraft flying within 10 nautical miles of the thunder storm.

b. Thunder Storm Warning Two. Thunder storms are forecasted to occur within 50 nautical miles of local area.

c. Thunder Storm Warning One. Thunder storms are eminent or occurring within five (5) nautical miles of station.

d. Units are CAUTIONED that all washes, canyons, and dry lake beds are prone to severe flooding without warning. Maps of all flood prone areas are available at Range Scheduling. Weather and topographic conditions must be evaluated carefully, prior to establishment of any position.

3014. TRAINING ACCIDENT AND INCIDENT REPORTING

1. General. This command requires that it be kept informed of any accident or incident that constitutes a serious or significant event or which may require notification to HHQ.

2. MCAGCC Reporting. Any unit involved in an accident or incident while operating in the RTAA will report the incident to BEARMAT. Reports shall be timely and may be relayed via Range Operations or a Range Safety Inspector. If additional information or reports are required, the unit will be notified. In the event of serious injury or death, units will preserve the scene of the accident until released by the investigating officer or commanding officer. In the event of an

accident resulting in a death, a representative from the deceased's organization will be assigned to accompany the remains to the Combat Center Naval Hospital and San Bernardino County Coroner's Office, if necessary.

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3. Parent Command Reporting. Reports submitted under this paragraph are not substitutes for reports required by appropriate directive nor do they constitute notification of a unit's chain of command. Reports submitted per directives, to include notification within the unit's chain of command, shall include the Commanding General, MCAGCC as an information addressee.

4. Reportable Incidents. Examples of accidents or incidents requiring a report to the ROO are:

- a. Aircraft or motorized vehicle accidents.
- b. Unintentional jettison of any material from an aircraft.
- c. Actual MEDEVACs.
- d. Ordnance released or dropped in the wrong area.
- e. Accidental discharges.
- f. Missing, lost, or stolen munitions.
- g. Serious injury or death.
- h. Anything that is liable to create interest or inquiries from the local civilian community.

3015. MINE SHAFTS. Abandoned mine shafts located throughout the RTA pose an extreme safety hazard and shall not be entered (paragraph 9009).

3016. CHEMICAL AGENTS. The use of chemical agents is restricted to CS. The proposed location and method of use must be approved by the Dir, O & T. If approved, CS may be employed when used within the following parameters:

1. CS agents will not be used in the immediate vicinity of the SELF.
2. Aircraft should not employ CS agent except as outlined in Appendix F and Chap 7.
3. Range 105 (Gas Chamber) is the only authorized location for the use of CS without the approval of the Dir, O & T.

3017. WAIVERS

1. CMC Memorandum TQL-11/5000 dated 27 Oct 94 designated the Combat Center as a Reinvention Laboratory, which grants the Commanding General, MCAGCC, waiver authority over any Marine Corps Order and Bulletin as they pertain to training aboard the Combat Center. Requests for relief from the requirements of the reference and other orders must be submitted directly to the CG, MCAGCC.

2. Requests for waivers to this Manual should be submitted to the Director, Operations and Training, prior to the commencement of any exercise. They should include the reason for the waiver, Surface Danger Zones (SDZ) drawn to scale, Hazard Analysis, and Safety Risk Assessments.
3. All requests for waiver shall be submitted using the format contained in Figure 3-1.

3018. SENSITIVE FUSE MUNITIONS

1. Sensitive fuse munitions will be fired only on approved ranges (Ranges 104, 110 and 601). See Appendix B for details.
2. The following ammunition is considered to be sensitive fused and will be fired on approved ranges only:
 - a. All improved conventional munitions (ICM) and dual purpose improved conventional munitions (DPICM) (Ground and Air delivered) (Range 601)
 - b. All 40mm HE and HEDP (MK-19 - Range 110, M-79/M-203 - Range 104)
 - c. 40mm TP (B-584) MK-19 (Range 110 only)
 - d. 40mm TP (B-577) M-203 (Range 104 only)
 - e. 25mm HEIT (Authorized in America Mine with Dir, O & T permission)
3. The ammunition listed in paragraph two above is NOT all inclusive. Prior to firing any new ammunition aboard the Combat Center contact either Range Safety or MCAGCC EOD to verify the status of that ammunition.

3019. SCRAPPERS

1. Scrappers are civilian personnel who are illegally aboard the Combat Center removing salvageable materials (aluminum, brass, copper etc) from the Range Training Areas. SCRAPPERS HAVE BEEN ARMED AND CAN PRESENT A DANGER TO ANYONE WHO APPROACHES THEM. If someone is seen or suspected of scrapping in the RTAs the following procedures should be followed:
 1. If no personal safety concerns exist:
 - a. Units or individuals that suspect someone of scrapping will notify BEARMAT immediately of your location and a brief description of the suspect's vehicle prior to making contact with the suspect(s).
 - b. Attempt to stop the suspect vehicle and instruct the occupant(s) to dismount (DO NOT ENDANGER MILITARY NOR CIVILIAN PERSONNEL).
 - c. Inform the suspect(s) why they were stopped.
 - d. Observe the suspect(s), paying close attention for weapons or drug paraphernalia.

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e. Observe the suspect(s) vehicle looking for weapons, drugs or drug paraphernalia, and evidence of scrapping activities (Government property, torching equipment, etc).

f. If possible, vehicle will be escorted to the nearest hard surface road where the suspects, along with their vehicle and any contraband seized will be released to the military police. If this is not feasible, the suspects will be held in place until the arrival of military police.

g. The detaining individuals/unit should be prepared to provide detailed statements to the military police reflecting their observations and their actions concerning this incident.

2. If safety concerns exist:

a. Notify BEARMAT immediately of your location and a brief description of the suspect's vehicle.

b. Attempt to gather as much information as possible to include:

(1) Vehicle model, color, license number;

(2) Time/Location/activity;

(3) Number of passengers;

(4) Description of suspects (height, weight, race, age, sex);

(5) If moving, the direction of travel;

c. The individual/unit should be prepared to provide detailed statements to the military police reflecting their observations and actions concerning this incident.

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Date

From: Commanding Officer, Unit Requesting Waiver
To: Commanding General, Marine Corps Air Ground Combat Center, Twentynine Palms,
California 92278-8104 (Attn: Director, Operations & Training)

Subj: REQUEST FOR WAIVER OF MCO XXXXXXXXXX

Ref: (a) CG MCAGCC msg R181000Z May 95
(b) MCO XXXXXXXXXX

Encl: (1) Surface Danger Zone Diagram (1:50,000 scale)
(2) Risk Assessment
(3) Maps or charts as necessary

1. Per reference (a), it is requested that a waiver be granted for page XX,
paragraph XXXX of reference (b).

2. It is requested that (UNIT) be authorized to (ACTUAL WAIVER DESIRED).

3. This waiver is desired in order to (JUSTIFICATION SHOULD EXPLAIN VALUE OF
TRAINING DESIRED, A COPY OF RISK ASSESSMENT AND STATEMENT THAT APPROPRIATE MEASURES
WILL BE TAKEN TO ENSURE SAFETY).

//SIGN//

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CHAPTER 4

COMMUNICATIONS

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CHAPTER 4

COMMUNICATIONS

4000. GENERAL. All units utilizing the RTAA shall establish and maintain communications with the Range Control Section (BEARMAT) on the safety net (49.85). BEARMAT shall:

1. Monitor radio frequencies for the purpose of maintaining positive control and management of the RTAA.
2. Grant clearance via radio to only those units and aircraft scheduled on the daily Range Schedule.
3. Ensure unit compliance with the requirements per this Manual.
4. Be manned and operational whenever a unit is using the RTAA.

4001. PROCEDURES

1. BEARMAT's nets are non tactical, therefore UNIT DESIGNATORS ARE TO BE USED VICE TACTICAL CALL SIGNS.
2. Radio traffic not intended for BEARMAT is not authorized on Range Control nets without permission from BEARMAT.
3. Ground units using the RTA are responsible for ensuring constant communication with BEARMAT. If necessary, radio relay RETRANSMISSION sites must be established.
4. Units using the RTA are required to continuously monitor 49.85 and make radio checks with BEARMAT hourly and at such other times as may be directed. If radio contact is lost the unit is responsible for taking corrective action.
5. Units in a bivouac status are required to monitor Bearmat but are not required to make hourly radio checks. Units may go into a bivouac status when all training for the day ceases, it is after 1800 at night, and they have the area scheduled for bivouac. Bivouac status ends at 0600 the next day or the beginning of training for the day, whichever is earliest.
6. If radio communication with BEARMAT is lost, that unit must cease all fire and maneuver until communication is re-established.
7. When the Higher Headquarters (HHQ) Command Element is in the RTA, it shall continuously monitor BEARMAT (unless covered by paragraph 4001.8 below).
8. Units do not need to monitor BEARMAT when they are on a hard surfaced road going to or from an RTA.
9. Units shall contact BEARMAT:
 - a. Prior to departing hard surface roads for clearance to ranges or to a RTA.
 - b. Upon arrival at range or maneuver area.
 - c. For permission to commence live fire (range going hot).

- d. Going into check fire or cease fire (range going cold).
- e. For hourly radio checks.
- f. When departing ranges.

g. For permission to secure from the net upon reaching the hard surface road or Camp Wilson. The unit shall inform BEARMAT that all personnel and equipment have been accounted for.

10. Failure to comply with these requirements shall result in the issuance of a Range Violation as described in paragraph 3003. Extreme violations may result in expulsion from the RTAA.

4002. TELEPHONE COMMUNICATIONS

1. Telephones are located on Range 101 (ext. 7874), Range 103 (ext. 7029 gate 7873 tower) and Range 104 (EXT 7877) to be used as a secondary communication systems, if required.

2. Cellular phones are authorized as an alternate means of communications when a unit/organization has no organic radios that can contact BEARMAT. Prior to a cellular phone being used the following information needs to be provided to Range Control:

- a. Phone number;
- b. Cellular Service;
- c. Verification of sufficient backup power sources;

3. HOURLY contact with Range Control((760)830-6623) is required. If the phone fails to properly operate, terminate all field operations and the unit/organization must depart the RTA immediately.

4003. FREQUENCIES The following frequencies are utilized by BEARMAT:

- | | | | |
|----|---------|--------|-----------------------------------|
| 1. | 49.85 | VHF/FM | Primary Range Control |
| 2. | 323.5 | UHF | Primary Airspace Control |
| 3. | 3338.0* | HF | Primary |
| 4. | 243.0 | UHF | Guard |
| 5. | 340.2 | UHF | SELF Tower |
| 6. | 321.8 | UHF | WISS |
| 7. | 135.525 | VHF/AM | SELF Tower (Civilian A/C Traffic) |
| 8. | 121.5 | VHF/AM | Guard (Civilian Guard) |
| 9. | 46.80* | VHF/FM | MEDEVAC/Alternate Range Control |

- | | | |
|-------------|-----|----------------------------|
| 10. 6860.0* | HF | Alternate |
| 11. 276.45* | UHF | Secondary Airspace Control |

* - Only monitored when designated

4004. RETRANSMISSION TEAMS. Retransmission Teams established for any exercise must maintain reliable communications with BEARMAT and the supporting elements. The retrans teams must remain on the net until all elements of the exercise force have been relieved and have cleared the RTAA.

4005. R-2501 AIRSPACE COMMUNICATIONS. R-2501 airspace communication procedures for use and control R-2501 airspace are contained in Chapter 7.

4006. LOST COMMUNICATION PROCEDURES. In the event of severe interference on 49.85, BEARMAT's primary ground control net, units in the field will be instructed to switch to a secondary frequency (46.80). All units will obtain a radio check on 46.80 and remain on that frequency unless instructed to return to 49.85. If a unit has no joy on the alternate frequency, switch back immediately to the primary frequency. BEARMAT will continuously monitor 49.85, 46.80, and 323.5 (and 3338.0 when designated) to ensure communications exist with all units and aircraft operating within the Combat Center RTAA.

4007. FREQUENCY REQUESTS. Units requiring additional frequencies for training/exercise requirements must submit their request to the MCAGCC Frequency Manager, Communication and Data Directorate. Frequency requests for large exercises (CAX, DESFIREX, etc.) should be submitted 60-90 days prior to the exercise.

4008. ELECTRONIC COUNTERMEASURES (ECM), JAMMING AND CHAFF. The use of electronic countermeasures (ECM), radio frequency jamming and chaff must be planned for and authorized by Range Operations well in advance of its employment. Care must be exercised so that local FAA radar and radio frequencies are not affected by the action. Additionally, the following information must be provided:

1. Electronic Countermeasures. Must be directional and narrow band to affect only a small exercise area. The employing unit must inform Range Scheduling of the extent of use (i.e.. time of day, duration).

2. Radio Frequency Jamming. Must be directional and narrow band to jam only those units in close proximity to the device utilized. Time of day and duration of use must be preplanned. Caution must be exercised not to interfere with BEARMAT's control of the RTAA.

3. Chaff

a. All ECM/CHAFF must be cleared in advance. Aircrews desiring to release chaff during a mission aboard MCAGCC must obtain authorization through their respective chain of command and forward the requests to Range Scheduling. All clearances must be routed through the Combat Center Frequency Manager per MCO 3430.1, for national, regional and local approval.

b. Requests should be submitted at least 30 days prior to an exercise. Requests should contain the following:

- (1) The type of chaff that will be used;
- (2) When it will be dropped;
- (3) Over what specific training area the chaff will be released so BEARMAT can coordinate with the FAA;
- (4) Altitude at which chaff will be employed.

c. CCO P2000.1 contains specific details and formats for submitting these requests.

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CHAPTER 5

RANGE MAINTENANCE

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CHAPTER 5

RANGE MAINTENANCE

5000. MISSION. The mission of the Range/Training Area Maintenance Section (RTAMS) is to:

1. Maintain and make minor improvements to the ranges and training areas.
2. Emplace targets in support of CAX training events coordinated by TTECG.
3. Coordinate post-CAX cleanup.

5001. TARGET EMPLACEMENT. RTAMS will emplace all targets in support of the CAX Target System. However, silhouette targets may be set up by units using a range if desired. Units must remove all such targets after use, and no established targets will be removed from any RTA. Units other than CAX units must request to use the CAX target system and be aware they are responsible for replacing any targets that are destroyed.

5002. AREA POLICE. It is the responsibility of the OCE/CO/OIC to ensure the RTA used by their units has been properly policed. All items brought into the RTA will be removed from the RTA.

1. RTA Police

a. Trash shall be collected and deposited in the Combat Center sanitary landfill (grid NT861925). No trash or other range residue will be buried or burned. Empty ammunition boxes are to be delivered to the MCAGCC landfill staging area for proper disposal.

b. Recyclable material will be turned in to the Defense Reutilization Management Officer (DRMO) per CCO 4010.1 using a Form 1348-1 with the following data: 17F3875.27RM 007 67399 0 000027 3C. Recyclables will not be disposed of in the landfill.

c. Hazardous material will be disposed of per CCO 5090.2. Hazardous materials will not be disposed of in the landfill.

d. Turn-in of range residue, brass, ammunition boxes, or other munitions items will be accomplished using the ammunition checklist located in Appendix F.

5003. BOUNDARY SIGNS. Boundary signs are placed whenever a major road crosses the base boundary or to restrict access to a designated range impact area. These markers are emplaced for safety purposes, and therefore the destruction and/or tampering with signs or markers within the RTA is punishable under the Uniform Code of Military Justice (UCMJ) and is strictly prohibited.

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CHAPTER 6

GROUND OPERATIONS

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CHAPTER 6

GROUND OPERATIONS

6000. GENERAL. All RTAs shall be scheduled per Chapter 2.

6001. PROCEDURES FOR TRAINING AREAS. All fire and maneuver within the Combat Center RTAs will be governed per the reference and this Manual.

1. Entering the RTA. Prior to departing for any RTA, the CO/OIC shall contact BEARMAT to report their intention to commence movement to the field. The routes of ingress and egress directed by BEARMAT will be strictly adhered to by the unit.

2. Access. BEARMAT will only authorize access to the RTA for those units previously scheduled through Range Scheduling. Units, which do not appear on the daily training schedule, will be informed by BEARMAT to contact the Range Scheduling Officer to be added to the daily schedule if an opening exists (Chapter 2).

3. Road Guards. Road Guards or MPs shall be posted to control movement of personnel, vehicles, and equipment to and from RTAs (paragraph 3002.9). After sunset, road guards will be equipped with and utilize an operable flashlight and wear a reflector vest.

4. Tracked Vehicle Movement. Tracked vehicle operators will utilize the concrete vehicle crossing pads in the asphalt paved roads in the north and the south side of the Main Camp area in moving to and from the vehicle parks and maneuver areas. They will ensure that a road guard is positioned on each side of the crossing pad facing oncoming traffic to stop all approaching vehicles or personnel. The tracked vehicle will not enter the crossing area until all traffic is stopped and a safe crossing can be conducted.

5. Commencement of live fire

a. The CO/OIC of the unit or senior headquarters shall contact BEARMAT on frequency 49.85 FM and inform them of their intentions to commence firing.

b. It is the responsibility of the CO/OIC to ensure that their unit is firing within the RTA authorized by the Range Scheduling Officer and that all personnel are safe from the effects of that fire. ALL FIRE OR THE EFFECTS OF THAT FIRE MUST REMAIN AT LEAST 1,000 METERS INSIDE OF ASSIGNED BOUNDARIES.

c. Only the weapons/ordnance listed on their request are authorized to be utilized.

6. Medical Assistance. A corpsman and a military vehicle with driver to transport injured personnel shall be located in close proximity to the unit's firing position.

7. RSO. An RSO will be assigned during live fire except where the CO/OIC is directly involved as discussed in paragraph 3001.4.

8. Air Sentry. Due to the intensity of air activity within the Combat Center's RTAA, including low level terrain flying by helicopters and "pop-up" attacks by jet aircraft, a minimum of at least one "Air Sentry" shall be posted at each artillery or mortar firing position. The Air Sentry must be able to give warning of aircraft in the firing area and the unit must be able to execute an immediate "CEASE FIRING."

9. Completion of live fire. Upon completion of firing, the CO/OIC will ensure that all weapons are safe and clear. The CO/OIC/RSO will contact BEARMAT prior to departing from the RTA and indicate the unit has completed firing and that all weapons have been checked safe and clear.

10. Departing the RTA. Before departing from an RTA, the CO/OIC will ensure a police of the area has been completed, pass the grid location(s) of all discovered unexploded ordnance, and state their intention to depart. Upon returning to the Exercise Support Base (ESB) or reaching any hard surface road, the unit will contact BEARMAT to report all personnel and equipment are accounted for, and request permission to secure from BEARMAT's radio net.

11. Coordination with supporting aircraft. Commanders incorporating aircraft ordnance delivery with their training will ensure that prior coordination between all aircrews and supporting unit elements takes place. It is preferable that this coordination be conducted face-to-face whenever possible.

6002. PROCEDURES FOR NUMBERED RANGES. All numbered ranges are governed by the procedures set forth in Appendix B. The procedures listed above will remain in effect with the exception of the specific procedures stated below:

1. Range Flags. Range Flags shall be hoisted on flag pole(s) located at each numbered range prior to the commencement of firing. The range flag(s) will be given to the CO/OIC/RSO at the safety brief conducted by Range Safety Inspectors.

2. Range Safety Inspectors. During normal working hours, Range Safety Inspectors will meet the unit at the numbered ranges prior to occupation to ensure all safety requirements have been met as well as a joint observation of area police. Upon completion of training, the Range Safety Inspectors will again meet with the RSO the numbered range to ensure proper clean-up of the area has been conducted prior to the unit departing the range.

3. Range Guards. Range guards shall be posted at all entrances to the range. The guards will have positive two-way communication with the RSO at all times.

4. Commencement of live fire. NO UNIT WILL COMMENCE LIVE FIRE WITHOUT PERMISSION FROM BEARMAT.

5. Bivouacking. Bivouacking on numbered ranges is not permitted without specific authorization from Range Scheduling.

6004

6003. UTILIZATION OF 400 SERIES RANGES

1. CAX Operations. The 400 Series Ranges (Ranges 400, 410, and 410A) were designed specifically for use by CAX forces, and therefore only these units are authorized to use the 400 Series Ranges during a CAX.
2. Non-CAX Operations. Resident commands and other units may use the 400 Series Ranges when a CAX is not aboard. To request use of the 400 series ranges, units must submit a letter to the Range Scheduling Officer a minimum of five (5) days prior to the date of use. The letter must address the following items.
 - a. Dates and times of live fire and bivouac.
 - b. Type of training to be conducted.
 - c. Type of weapons to be utilized.
 - d. Type of ammunition to be fired (Be specific).
 - e. Acknowledgment of responsibility to rebuild range targets and bunkers.
 - f. Specific time line if battalion round robin is being conducted (by company).
 - g. Acknowledgment of arrangements with EOD to sweep the range at conclusion of training.
 - h. Name and phone number of responsible officer and/or point of contact.
3. CAX and the supporting units will retain priority in the 400 series ranges. This includes RTAMS and EOD.
4. RTAMS must be allowed five (5) working days on the 400 series ranges for maintenance and targetry prior to each CAX.

6004. REQUIREMENTS FOR PASSING CONTROL OF THE RTAA. Requirements for an exercise force to assume control of the RTAA are contained in paragraph 2005. Amplifying instructions are contained in Appendix J.

NOTE: UPON ACCEPTING CONTROL OF THE RTAA, THE OCE IS RESPONSIBLE FOR THE SAFETY OF THE EXERCISE FORCE AND FOR ENFORCING ALL REQUIREMENTS OF THIS MANUAL. WHEN AN EXERCISE FORCE ASSUMES CONTROL OF THE RTAA, NO PREVIOUSLY SCHEDULED TRAINING MAY BE INTERFERED WITH OR CANCELED BY THE EXERCISE FORCE WITHOUT THE CONCURRENCE OF THE SCHEDULED UNIT.

6005

6005. SCHEDULING MTU RANGES.

1. The OIC of the MTU controls and schedules the following ranges:

Range 1 - Known Distance Rifle Range

Range 1A - BZO Range

Range 1B - Unknown Distance Range

Range 2 - Known Distance Pistol Range

Range 2A - Moving Target Pistol Range

Range 2B - Combat Pistol Range

Range 2C - Military Police Range

2. Phone numbers are (760) 830-7280/6879 Commercial
957-7280/6879 DSN

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CHAPTER 7

AVIATION OPERATIONS

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CHAPTER 7

AVIATION OPERATIONS

7000. GENERAL

1. All flight operations in the airspace of the Combat Center will be conducted per current directives regarding positive control of aircraft. "Military Assumes Responsibility for Separation of Aircraft (MARSA)" rules in Restricted Area R-2501. Procedural control and "see and be seen" doctrine applies at all times to ensure separation from other exercise and non-exercise aircraft. This Manual is not intended to supersede existing Federal Aviation Regulations, OPNAV 3710, NATOPS, Wing Directives or the Training and Readiness (T&R) Order.

2. Aviator requirements. The Restricted Airspace R-2501 is an umbrella of airspace over the Combat Center from ground to infinity. Prior to air operations in R-2501 individual pilots must:

a. Be aware that the R-2501 accommodates air-to-ground, air-to-air, ground-to-air, and ground-to-ground training exercises.

b. Air-to-air training exercises normally require the use of more than one of the four areas that comprise R-2501.

c. R-2501 is divided into the following areas: R-2501 North, South, East, and West.

3. R-2501. The sections of R-2501 correspond to the following RTAs (Appendix C):

a. R-2501 North. Restricted airspace extending from the surface to unlimited altitude. It overlies the Gays Pass, Maumee Mine, Sunshine Peak, Lavic Lake, Rainbow Canyon, Blacktop, and Noble Pass RTAs. The R-2501 North area accommodates air-to-ground, ground-to-ground and ground-to-air training exercises. All conventional ordnance may be employed except MK-20 (Rockeye) and other sensitive fused weapons, which may be utilized only on Range 601 located within the Rainbow Canyon RTA.

b. R-2501 South. Restricted airspace extending from the surface to unlimited altitude. It overlies the Delta, Prospect, East, Mainside, West, Sand Hill, Range, Gypsum Ridge, and portions of the Noble Pass RTAs. The R-2501 South area provides air-to-ground, ground-to-ground and ground-to-air training exercises. All conventional ordnance may be employed except for MK-20 (Rockeye) and critical fused weapons. The Sand Hill, West, East, Gypsum Ridge, and Mainside RTAs, and the Emerson Lake RTA south of the 05 Northing, are no-impact areas. Additionally, there is an area within the Sand Hill RTA that is a Desert Tortoise habitat, wherein no live fire nor maneuver is authorized.

c. R-2501 East. Restricted airspace extending from the surface to unlimited altitude. It overlies the America Mine, Cleghorn Pass, Bullion, Lead Mountain and Lava RTAs. The R-2501 East area provides for air-to-ground, ground-to-ground and ground-to-air training exercises. All conventional ordnance may be employed except

for MK-20 (Rockeye) and critical fused weapons. No live or inert ordnance is permitted in grid squares NU9709, NU9809, and NU9909, which are located in the Lava RTA. This is a petroglyph site and is of significant historical value. The WISS (R603) is located in R-2501 East.

d. R-2501 West. Restricted airspace extending from the surface to unlimited altitude. It overlies the Acorn, Quackenbush Lake, and Emerson Lake RTAs. The R-2501 West area provides for air-to-ground and ground-to-ground training exercises. All conventional ordnance may be employed except MK-20 (Rockeye) and critical fused weapons. Acorn RTA is a non-live fire RTA.

3. Altitude considerations. Ground-to-ground training which interferes with airspace due to the trajectory or fragmentation pattern of the ordnance may occur in any of the subdivisions of R-2501. The maximum altitude may only exceed the normal operating altitude ceiling (26,000 feet MSL) with specific permission of the Director, Operations and Training. All scheduling for the RTAA is three-dimensional and coordination for airspace to provide separation between aircraft and ground fired ordnance shall be through Range Scheduling.

4. Range Control responsibilities. BEARMAT has UHF, VHF/AM, VHF/FM, and HF capability and is responsible for:

- a. Clearing arrival and departure of aircraft utilizing the R-2501.
- b. Clearing arrival and departure of aircraft landing at LZ-1, LZ-7(LZ Ripper), LZ-10 and LZ-16 (paragraph 7002).
- c. Providing specific approval prior to the commencement of all live fire. During CAXs the DASC/GCE RSO will coordinate the live fire evolutions with BEARMAT.
- d. Controlling MEDEVACs per paragraph 3006.
- e. Providing advisory service to aircraft entering R-2501 of the current live firing areas, troop locations, and other pertinent information as required. Limited flight filing is available.
- f. Providing procedural control of aircraft utilizing the standard MCAGCC Fixed Wing and Rotary Wing Control Points (CPs) (Appendix E).
- g. Notifying the Strategic Expeditionary Landing Field (SELF) if a MEDEVAC or transient aircraft requires fuel (NOTE: Per FLIP En route Pub, SELF use or refueling requires PPR).
- h. Conducting operations as a Military Radar Unit when certified by the FAA. Operations will be conducted according to the MRU training syllabus and BEARMAT SOP.

7001. CONTROL OF AIRCRAFT OR UNMANNED AERIAL VEHICLES (UAVs) WITHIN R-2501 FOR NORMAL FLIGHTS

- 1. Units will submit requests to use the airspace of R-2501 per Chapter 2.
- 2. All units scheduled for use of R-2501 must ensure that all aircrews receive a Range Orientation/Safety Brief. Unit representatives, i.e., Operations Officers,

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Tactics Officers or Strike Officers, may receive an initial brief from the Air Representative, TTECG; the Range Control Officer; or the Range Scheduling Officer and subsequently brief all of their unit's aircrews.

3. Prior to entering the R-2501, aircraft (pilots/flight leaders) shall contact BEARMAT on 323.5 UHF or 49.85 FM. The pilot/flight leader will give the callsigns, current position, altitude, MODE III squawk, the number and type of aircraft, the ordnance aboard each aircraft, and the RTA scheduled. BEARMAT can also provide limited radar advisories for aircraft operating at 6,000 feet AGL and above.

4. Only those aircraft or UAVs scheduled on the Combat Center's daily training schedule will be cleared into R-2501 airspace.

5. BEARMAT will advise all aircraft of the altitude limits, troop positions, live firing areas, and other pertinent information.

6. Aircraft (pilots/flight leaders) shall contact BEARMAT prior to departing the R-2501, providing the number and type of ordnance expended, and approximate location of any known or suspected duds.

7. Aircraft shall avoid operating within the five mile arc of the SELF Class "D" Surface Area (CDSA) without two way radio communications with Palms Tower (340.2).

8. UAV operations will be conducted per Appendix I.

7002. MAINSIDE LANDING ZONES. BEARMAT must specifically authorize any aircraft landing operations in the vicinity of Mainside. The four authorized LZs in Mainside are:

1. LZ-1. LZ-1 is located on the Commanding General's Parade Deck in the vicinity of grid NT868888. Only helicopters transporting VIP Code 6 (Colonel/USN Captain) or above are authorized to use LZ-1. VIP helicopters will land and shutdown in the vicinity of the northeast corner of the Commanding General's Parade Deck.

2. LZ-7. LZ-7, or LZ Ripper, is the only tactical LZ located in the Mainside Area. It is located 200 meters southeast of LZ-10 (grid NT877887).

3. LZ-10. LZ-10 is the MEDEVAC standby pad. It is located northeast of the Bowling Alley (grid NT873888). It is a 100 X 150 foot pad, which is lighted at night and has a wind sock. Helicopters other than the MEDEVAC helicopter require authorization by BEARMAT prior to using LZ-10.

4. LZ-16. LZ-16 is located at the Naval Hospital (grid NT877875). It is lighted and has a wind sock. Helicopters may shut-down in this zone only while waiting to drop off or pick up MEDEVACs. Otherwise, this zone must remain clear at all times to receive actual MEDEVAC aircraft.

7003. AIRCRAFT SECURITY. Exercise forces are responsible for providing security for their aircraft.

7004. DROP ZONES. There are three designated parachute drop zones authorized for unit parachute drops. Parachute drops in other RTAs are authorized, however the use of the designated drop zones is recommended because they are relatively clear of large obstructions which could injure parachutists. The following drop zones have been designated:

1. Drop Zone Giant Rock. Training Area: Emerson Lake. Located at grids NU57900775 to NU58920828 to NU62460326 to NU61340241.
2. Drop Zone Sand Hill. Training Area: West. Located at grids NT75939125 to NT76209174 to NT75599212 to NT75409191.
3. Drop Zone Joshua. Training Area: Sand Hill. Located at grids NT76399110 to NT77369243 to NT72559389 to NT73519523.

7005. ASSAULT LANDING ZONE (ALZ) "SAND HILL"

1. General. This is an unimproved sand airfield with midpoint located at grid 742925. Runway length of ALZ Sand Hill is 5000 feet, elevation 2200 feet and runway headings are 300 and 120. The ALZ qualifies for AF JA/ATT C-130 aircraft.
2. Requirements for utilizing ALZ Sand Hill. The following requirements for using ALZ Sand Hill are in effect:

- a. The using unit is responsible for inspection and certification of ALZ Sand Hill. An RTA request is required 60 days in advance with initial certification accomplished 50 days prior to scheduled operations. Final certification of ALZ Sand Hill should be completed 7 days prior to scheduled operations.

- b. MCAGCC has one Crash Fire Rescue (CFR) truck for CFR coverage at ALZ Sand Hill. The using unit must provide for any additional requirements.

- c. The using unit is responsible for providing funding data in advance to the MCAGCC Comptroller to pay for the following:

- (1) Overtime for CFR crew (MCAGCC Fire Department Personnel).
- (2) POL for CFR equipment (Fire Department).
- (3) ALZ runway preparation and certification costs.

3. Airfield Operations. All aviation operations at ALZ Sand Hill are within the SELF CDSA, under the control of Palms Tower (340.2 or 126.2, ground 362.2 or 41.7).

- a. Authorization to use ALZ Sand Hill does not include authorization to use the SELF unless coordination has been made with the Airfield Operations Officer, MWSS-374, and DSN 230-7814/7899.

- b. The using unit must identify, arrange for, and fund all special equipment required to support operations.

7006. BRISTOL (MOA)

1. General. The Bristol MOA is special use airspace located adjacent to the eastern boundary of R-2501 East. Specific dimensions are included in Appendix C. The Bristol MOA is used for air combat maneuvering, all-weather flight training and tactical air exercises. Ordnance delivery is not authorized.

2. Scheduling. Units desiring to use the Bristol MOA will submit requests per Chapter 2.

3. Requirements. The Combat Center/Los Angeles Center FAA Letter of Agreement requires aircraft using the Bristol MOA to comply with the following requirements:

- a. Aircraft must file a DD Form 175, IFR flight plan with the FAA.
- b. Aircraft must be placed into the MOA by sector 10/11 of Los Angeles Center.
- c. The FAA uses real-time separation in the MOA and will not place military aircraft into the MOA until all itinerant IFR traffic has cleared the MOA.
- d. Military Assumes Responsibility for Separation of Aircraft (MARSA) rules apply when the Bristol MOA is used.

7007. SUNDANCE MOA1. General

a. Description. The Sundance MOA is special-use airspace located in the Twentynine Palms airspace complex area adjacent to the southern boundary of R-2501 East and South. Specific dimensions are included in Appendix C. Operations within the Sundance MOA are limited to special operations required in conjunction with the R-2501. Ordnance will not be employed within or fired from the Sundance MOA.

b. Primary use. The Sundance MOA is designed to handle the problem of aircraft spilling out of R-2501 while supporting the CAX during attacks on targets in the southern portion of Delta RTA. As a result, the Combat Center/Los Angeles Center FAA Letter of Agreement states that the Sundance MOA will only be activated as required to support the CAX program (approximately 10 times per year).

2. Scheduling. Units desiring to use the Sundance MOA will submit requests per the instructions contained in Chapter 2. Non-CAX units desiring to use the Sundance MOA will submit requests at least 60 days in advance to allow for coordination with the Los Angeles Center. A NOTAM must be issued when the Sundance MOA is activated.

7008. UNMANNED AERIAL VEHICLES (UAV'S). UAV operations are restricted to Outlying Field (OLF) Seagle by order of the Commanding General, 3d MAW. The OLF is for use

by UAV operations only and may not be utilized by any other aircraft. Flight operations are guided by pertinent Federal Aviation Regulations (FAR), OPNAVINST 3710.7N, Appendix I, and other publications as appropriate. The OLF is within the Class D Surface Area (CDSA) of the SELF and under the control of Airfield Operations, MWSS-374, when the SELF is open. When the SELF is closed, BEARMAT is the controlling agency. All flights outside the ATA must be scheduled per the procedures in Chapter 2. UAVs operating in the RTAA must maintain communications with BEARMAT and Palms Tower, and monitor GUARD.

7009. WEAPONS IMPACT SCORING SYSTEM (WISS) (R603). The WISS is a computerized system used for the scoring and evaluation of bombing training. It is located in the Bullion Training Area and consists of a target in the center of a graded range and two block buildings. The buildings contain the equipment required to monitor the range and transmit information to a computer console located at BEARMAT. The range and the scoring system are controlled by a Civilian Contractor. Requests for the use of the WISS should be submitted per Chapter 2. Additional information concerning the WISS is provided in Appendix B.

7010. FIXED WING LOW ALTITUDE TACTICS (LAT) AND ROTARY WING TERRAIN FOLLOWING (TERF) ROUTES. The LAT course and the TERF routes located at MCAGCC are contained in Appendix L. These areas must be scheduled through Range Scheduling prior to use.

7011. AERIAL REFUELING TRACKS. The aerial refueling tracks (Figure 7-2) are established in the Bristol MOA/ATCAA airspace. Schedule these tracks per paragraph 7006. Specific dimensions of the Bristol MOA/ATCAA and instructions are included in Appendix C.

7012. FIXED WING INGRESS/EGRESS ROUTE. Fixed wing aircraft not originating from the SELF will use the Ingress/Egress route (Figure 7-3) via the Blue 9A/9B stereo route and report to BEARMAT when entering the R2501 restricted airspace. BEARMAT will provide a range brief. While receiving the range brief, anchor on a track between CP Century and CP Nissan (inside the dotted lined box). Ingress at FL 210 and egress at FL 200. Contact LA Center prior to departing R2501 Airspace.

7013. FORWARD ARMING AND REFUELING POINTS (FARP)

1. The following nine locations have been pre-approved for forward arming and refueling points. The coordinates are approximate and the sites are irregular polygons that follow the main service roads or the terrain features in which they are located.

a. Cleghorn Pass: Grid NU929089 to NU935097. Follows MSR, FARP site is south of road and is a horseshoe shaped area.

b. East: Grid NT897927 to NT905927 to NT905930 to NT898930 to start.

c. Emerson Lake: Grid NU568127 to NU574128 to NU573135 to start. (Irregular triangle)

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- d. Gypsum Ridge: Grid NU689019 to NU688019 to NU689018 to NU699-19 to start.
- e. Lavic Lake: Grid NU663325 to NU665318 to NU6683420 to start. (Irregular triangle)
- f. Noble Pass: Grid NU779169 to NU790169 to NU787167 to NU779167 to start.
- g. North Lead Mountain: Grid NU951207 to NU962208 to NU954212 to NU964212 to start.
- h. Quackenbush Lake: NU689094 to NU692088 to NU688083 to NU686086 to start.
- i. South Lead Mountain: Grid PU038099 to PU043100 to PU045094 to PU039092 to start.

2. In addition to the sites established above, the following guidelines are furnished concerning mobile FARP operations for the refueling of helicopters and tactical vehicles in the field.

a. Refueling trucks may stop and refuel helicopters and tactical vehicles on any Main Supply Route (MSR) within MCAGCC's Range Training Areas (RTAs) except for the Sand Hill RTA. Due to the existing potable water well field and the biological and cultural sensitivity, refueling operations will not be conducted in the Sand Hill RTA.

b. Fuel spills will be handled per paragraph 10003.2.

c. If the MSR is unacceptable for FARP operations, the refueling can take place adjacent to and as close as possible to the MSR in any PREVIOUSLY disturbed area. No new roads or trails will be created for these operations.

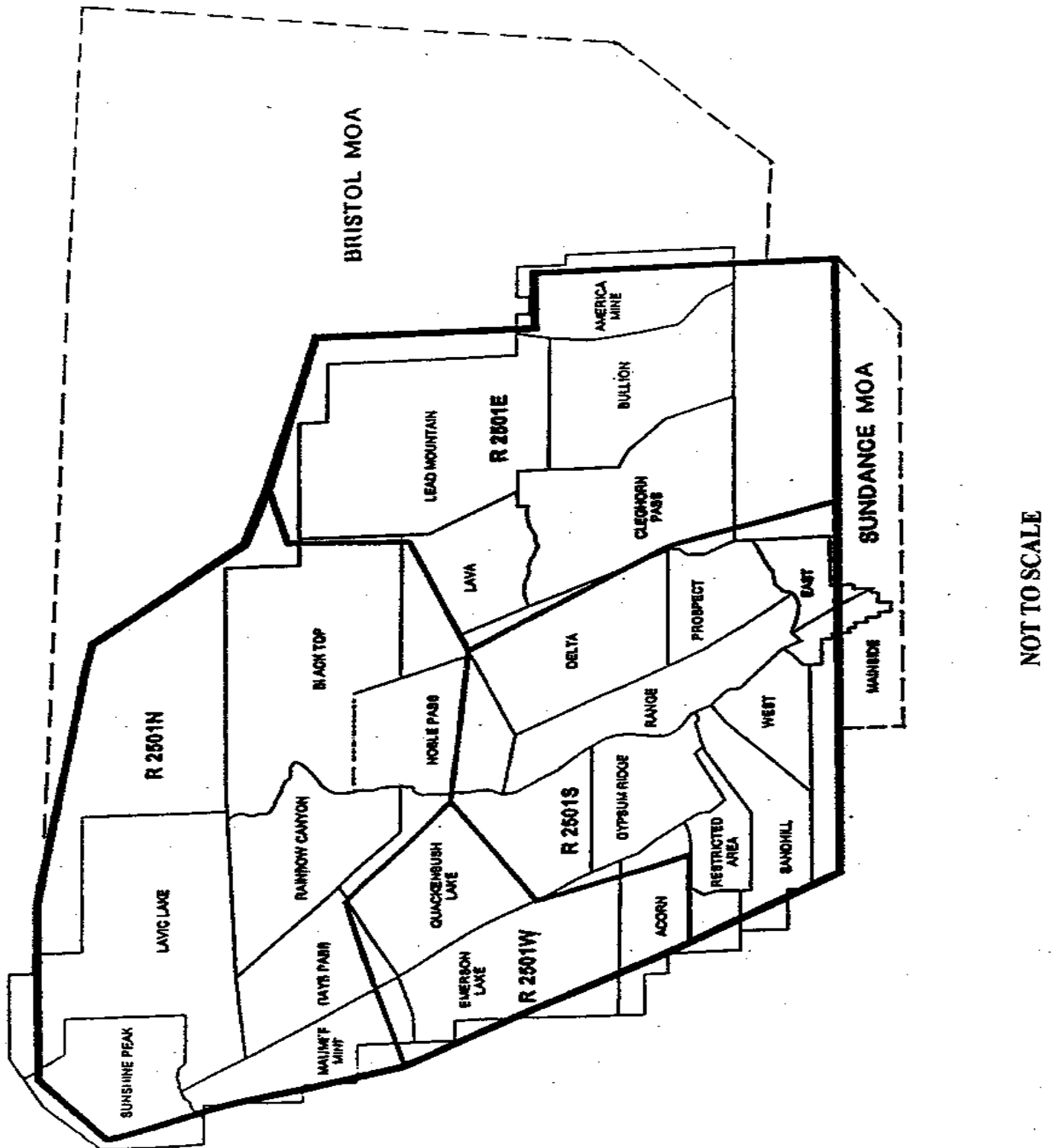


Figure 7-1.--Restricted Airspace (R-2501)

Bristol MOA/R2501 Aerial Refueling Tracks

Diagram not to scale.

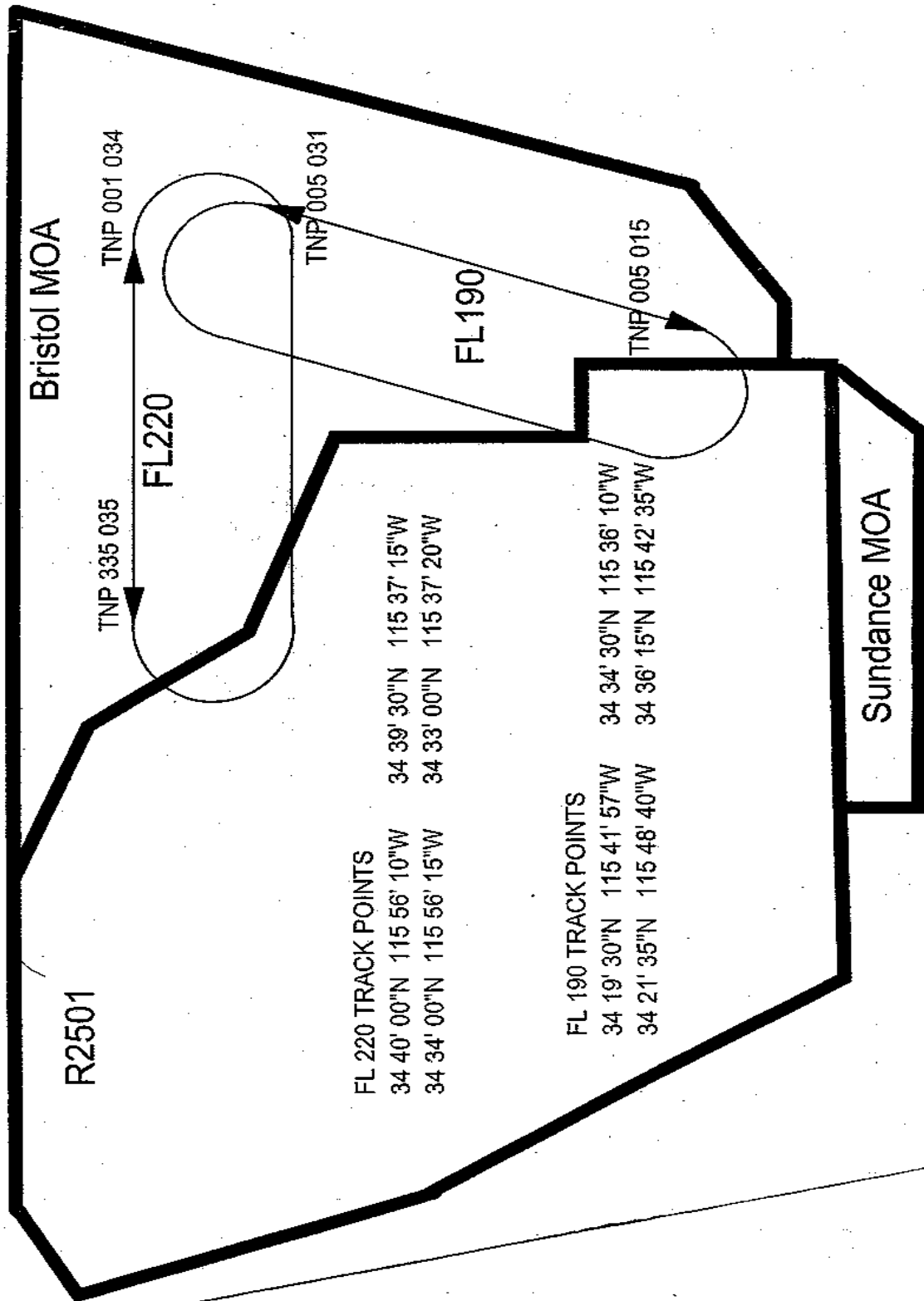
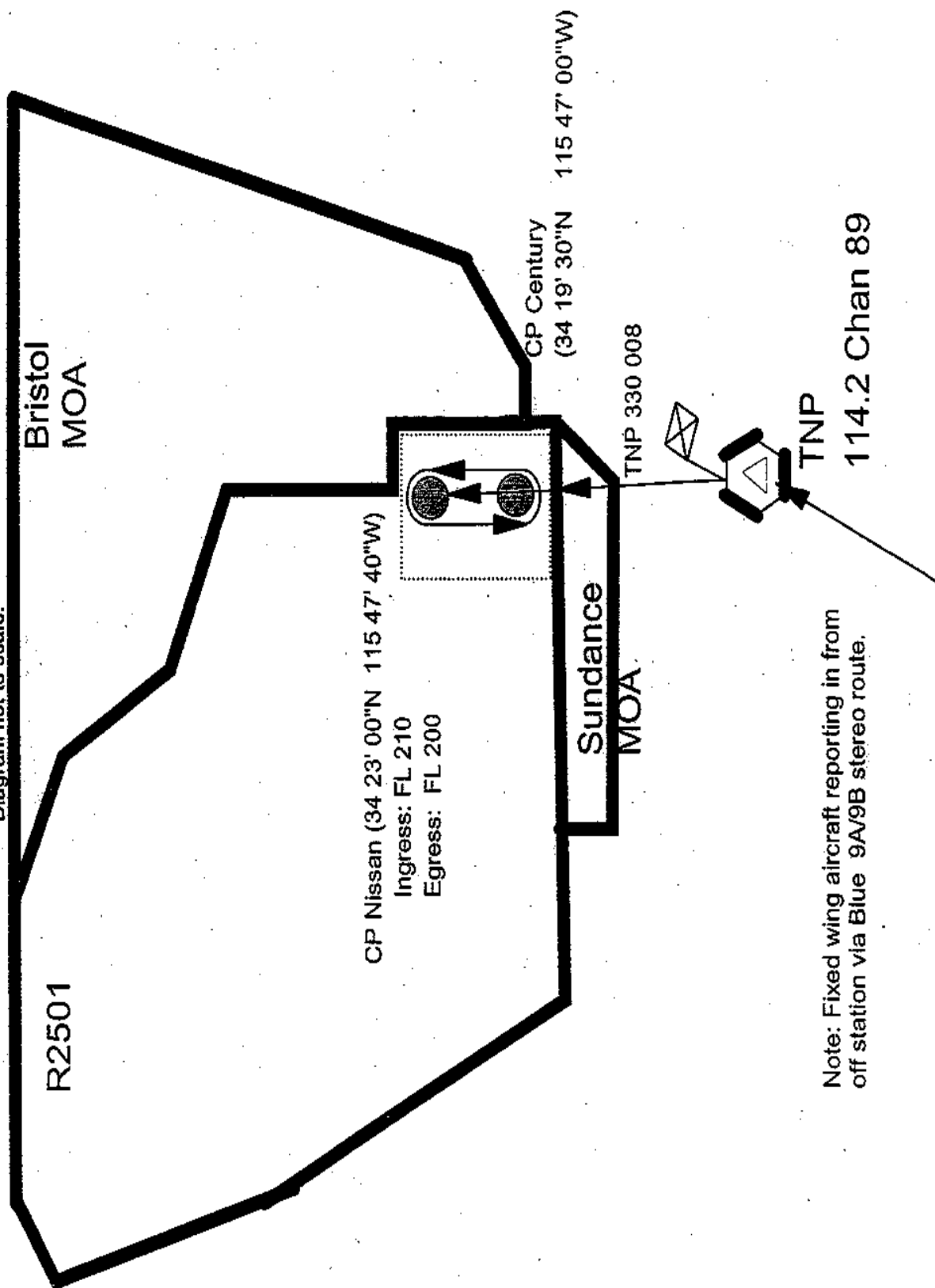


FIGURE 7-2, --AERIAL REFUELING TRACKS

Diagram not to scale.



Note: Fixed wing aircraft reporting in from off station via Blue 9A/9B stereo route.

FIGURE 7-3,--FIXED WING INGRESS/EGRESS ROUTE

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CHAPTER 8

COMBINED ARMS EXERCISE (CAX) PROGRAM

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CHAPTER 8

COMBINED ARMS EXERCISE (CAX) PROGRAM

8000. CAX PROGRAM

1. General. MCO P3500.11D outlines the requirements of the Marine Corps' Combined Arms Exercise (CAX) Program. The CAX is the primary live fire training conducted aboard the Combat Center.

2. Tactical Training And Exercise Control Group (TTECG). TTECG is responsible for conducting the CAX Program for Fleet Marine Force units and the Fire Support Coordination Application Course (FSCAC) in support of the Amphibious Warfare School (AWS). TTECG retains scheduling priority in support of the CAX and FSCAC programs.

8001. EXERCISE COORDINATOR. The Officer Conducting the Exercise (OCE) will assign an Exercise Coordinator prior to the beginning of any CAX training. The coordinator shall process scheduling requests from the CAX force and serve as a point of contact between the exercise force and the Combat Center in order to reconcile any problems that arise.

8002. CAX SCHEDULING

1. General

a. The CAX Program has priority over all other training aboard MCAGCC. Scheduling procedures are per Chapter 2.

b. CAX related scheduling must be accomplished through Range Scheduling. Pre-FINEX requests must be submitted at least 45 days prior to the arrival of the OCE and the first day of training of the two (2) cycle CAX period in order to allow for scheduling deconfliction. The CAX no longer retains priority, with the exception of the 400 series ranges, within 45 days of arrival of OCE. Once a CAX evolution has begun, CAX requests must be forwarded through the Exercise Coordinator.

c. During a CAX evolution, units not participating in the exercise may schedule ranges so long as they do not interfere in CAX training. Furthermore, any previously scheduled training by non-CAX units may not be disrupted or canceled without concurrence from the Dir, O & T.

2. Air Support Coordination Exercise (ASCEX), Fire Support Coordination Exercise (FSCEX), Mobile Assault Course (MAC), and the Helicopter Assault Course (HAC). ASCEX, FSCEX, MAC, and the HAC each have unique RTAA scheduling requirements. TTECG will have scheduling priorities over ground and airspace required to conduct these exercises. The Range Scheduling Officer shall resolve all conflicts per paragraph 2002.

3. 400 Series Ranges. The 400 Series Ranges (Ranges 400, 410, and 410A) were designed specifically for use by CAX forces. Due to maintenance and cleanup

requirements, only CAX-participating exercise forces are authorized to use the 400 Series Ranges while a CAX is being conducted. Exceptions for the use of the 400 series ranges by non-CAX forces will be considered by Range Scheduling, pending concurrence by the CAX Force.

8003. CAX TARGET SYSTEM. Range Maintenance (RTAMS) will emplace all targets in support of the CAX Target System. Any training involving automated targets and training devices must be coordinated through the Training Systems Resource Management Section, ext. 7116.

8004. CAX SAFETY

1. All elements of a CAX exercise force shall be governed by the reference, this Order, applicable TMs, unit SOPs, and common sense while operating in the Combat Center's RTAA.
2. The CAX Safety Handbook published by TTECG is far less restrictive than the reference regarding live fire training and is directive in nature for TTECG controlled events only. Units conducting live fire training not under the control of TTECG SHALL NOT utilize the CAX Safety Handout.

8005. AIR OPERATIONS

1. General. All aircraft will comply with the instructions per Chapter 7. Range Scheduling will not approve requests for flights into R-2501 once the Direct Air Support Center (DASC) supporting the CAX has taken control of the exercise airspace, unless the flights are in support of the exercise force. When the DASC has formally taken control, all flights within R-2501 will be under the control of the DASC except for the airspace controlled by the SELF, and R-2501 East during the ASCEX, FSCEX, and MAC. The OCE shall provide TTECG and BEARMAT with the following information:

- a. DASC callsigns and frequencies.
- b. CPs and IPs (six-digit coordinates) other than those listed in Appendix E.
- c. HCPs, HAs, APs, and LZs (six digit coordinates).
- d. ATOs of all approved fixed wing and rotary wing aircraft, which will participate in the exercise.

NOTE: IN THE INTEREST OF SAFETY, NO AIRCRAFT WILL BE ALLOWED IN THE EXERCISE AREA WITHOUT THE PRIOR PERMISSION OF THE DASC AS SHOWN ON THE ATO PROVIDED TO BEARMAT.

2. Flight operations originating off-station

- a. Aircraft (pilot/flight leader) shall check-in with BEARMAT prior to entering R-2501 for hand-off to the DASC.

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b. BEARMAT will provide advisory service as required or requested to include live fire areas, other aircraft in the area, etc.

c. Upon completion of the mission, the DASC will direct aircraft to check-out with BEARMAT prior to departing R-2501.

3. Flight operations originating from the SELF. See 3d MAW Order P3700.1C for instruction pertaining to the use of the SELF. Once the DASC has taken control of the airspace, aircraft operating from the SELF will check-in with BEARMAT for hot range briefs and then switch to the DASC prior to departure from the control area of the SELF. The aircraft can receive their brief on deck at the SELF with a confirmation in air that their brief is current.

4. Airspace coordination. An Airspace Coordination Meeting must be accomplished between the exercise force and Range Control prior to the commencement of any air operations within the RTAA. At a minimum, the meeting should include representatives from the Ground Combat Element (Range Control) and Air Combat Element (DASC) per Chapter 7.

8006. CAX POLICE

1. A minimum 72-hour period for dedicated range police at the end of an exercise is required from all CAX forces. Range Maintenance shall coordinate post-CAX cleanup with the exercise force CSSE.

2. Upon completion of a CAX, a post-exercise inspection of the RTA will be conducted during the airborne range sweep by representatives from the exercise force and the ROO.

3. The CAX force will not depart the Combat Center until the RTAA is in a proper state of police. This includes any numbered ranges and observation posts that were utilized by the exercise force.

4. A concept of operations on how the police of the training areas will be executed will be delivered from the RTAMS OIC to the RCO informing Range Control.

5. All exercise force EOD personnel will conduct ordnance residue cleanup and UXO clearance sweeps with MCAGCC EOD personnel during post CAX cleanup as required.

8007. EXCLUSIVE USE OF THE RTAA. CAX forces will be assigned exclusive use of the RTAA for the conduct of the FINEX only. The exceptions contained in paragraph 2005 apply.

8008. NORDO HUNG ORDNANCE/FREE DROP ZONE PROCEDURES. The requirements established in Appendix H apply. However, the following exceptions may be authorized by the Director, TTECG:

1. In the interest of safety, on those instances where training is conducted under the control of TTECG, an alternate hung ordnance/free drop zone (FDZ) may be designated by TTECG to ensure that no ordnance deliveries will be made behind TTECG's axis of movement.

2. Any alteration of the FDZ away from Sunshine Peak RTA must be annotated on the ACE's daily Air Tasking Order (ATO).

3. At no time will the America Mine RTA be authorized as a hung ordnance/FDZ.

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CHAPTER 9

RESTRICTED AREAS

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CHAPTER 9

RESTRICTED AREAS

9000. GENERAL. This chapter identifies specific areas of the Combat Center RTAA that are restricted for use except as designated in the paragraphs below.

9001. RANGE RESIDUE AREA (RANGE 112)

1. The range residue area is the 7906 grid square (1000m x 1000m).
2. This area is for the explicit use of NREA process range residue. It is out of bounds to all personnel not involved with processing range residue.

9002. NO FIRE/MANEUVER AREAS. The following Combat Center areas are designated as "No Fire/Maneuver Areas": (Restriction of fire and maneuver into these areas must be strictly adhered to)

1. EOD demolition range (Range 112) as described in paragraph 9001.
2. Petroglyph Sites at grid squares NU9709, NU9809, and NU9909 located in the Lava RTA (paragraph 10005). Vehicles may traverse existing MSRs.
3. Archaeological Sites at grid squares NU5937, NU6037, and NU6137 are located in the Lavic Lake RTA (paragraph 10005). Vehicles may traverse existing MSRs.
4. Mainside Area (includes blanks).
5. Sunshine Peak RTA. This is an aviation NORDO HUNG ORDNANCE area and aircraft are authorized the emergency release of ordnance at any time.
6. The Tortoise Nesting Site is at grid coordinates NT648983 to NT643975 to NT645968 to NT645944 to NT709944 to NT762974 to NT758978 to NT729962 to NT719959 to NT710968 to NT709976 to NT703986 to NT679982 to NT648983, within the Sand Hill RTA. Travel is restricted to established MSRs, and no cross country travel, foot traffic, live fire, or bivouac is allowed in this area.
7. Tortoise study plots:
 - a. Emerson Lake RTA - Grid NU550050 to NU560060 to NU560060 to NU550060.
 - b. Sand Hill RTA - Grid NT649922 to NT649932 to NT659932 to NT659922.

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8. Observation Posts:

- a. OP Creole - Grid NU637100, 1,500 meter buffer
- b. OP Round - Grid NU649215, 1,500 meter buffer
- c. OP Cross - Grid NU781102, 1,500 meter buffer
- d. OP Crampton - Grid NU831031, 1,500 meter buffer

9. Safety Net Repeaters:

- a. OP Argos - Grid NU524282, 500 meter buffer
- b. Rainbow Canyon RTA - Grid NU723185, 500 meter buffer
- c. Bullion RTA - Grid NU996037, 500 meter buffer
- d. Lava RTA - Grid NU883127, 500 meter buffer
- e. OP Creole - Grid NU637100, 500 meter buffer

10. Surprise Springs archaeological sites are at grid coordinates NT709959, NT719959, NT719952, and NT709952 within the Sand Hill RTA (paragraph 10005.3e). In order to effect preservation, ALL entry, to include infantry, vehicle maneuver, and recreation is prohibited.

11. The Water Systems Project are located at grid coordinates NT647982 to NT643976 to NT645966 to NT645942 to NT709942 to NT762974 to NT757978 to NT719960 to NT710969 to NT710976 to NT704987 to NT679982 to NT647982 within the Sand Hill RTA. Due to water pipes, pumps, and electrical wires the use of roads through this area is prohibited (paragraph 10004.1).

12. A ten meter area around well sites (paragraph 10004.2).

13. The historical sites listed in paragraph 10005.

14. The Exercise Support Base (ESB), Camp Wilson settling ponds, located in the vicinity of grid coordinate NT78319736 per paragraph 10004.3.

15. The Range Instrumentation Sites (RIS) located in the Delta RTA at grids NT862995, NU891029 and NT925975 have a 500 meter buffer around each site.

9003. SPECIAL USE AREAS

1. Mainside is a nonlive fire RTA. The East RTA is designated a nonimpact area from which live fire may be delivered. Acorn, West, Sandhill and East RTAs may be used for blanks and pyrotechnics. BEARMAT will be notified prior to any use of blanks or pyrotechnics.

2. The America Mine RTA is a designated special use area. Live fire or impact may only be authorized by the Dir, O & T. Ground access to America Mine requires

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transit over BLM land. Instructions for obtaining access to BLM land are contained in Chapter 2 para 2-6.

3. Sunshine Peak has been designated as the Hung Ordnance Area. Transit through or any other use of this RTA requires approval of the Dir, O & T using the procedures established in paragraph 3017 and Figure 3-1. A minimum of 60 days advance notice is required.

9004. CLEGHORN PASS TRAINING AREA. Live fire in the Cleghorn Pass RTA is restricted to Range 500 and the 400 Series Ranges. Specific details concerning these ranges are included in Appendix B. The only authorized bivouac area is west of the 99 Easting and south of the 97 Northing. No off-road (MSR) vehicle transit is authorized.

9005. SENSITIVE FUSED MUNITIONS RANGE (RANGE 601). This area is for the impact of special weapons, such as Dual Purpose Improved Conventional Munitions (DPICM), Cluster Bomb Units (CBU), and ROCKEYE. Due to the large number of extremely sensitive UXO, which are scattered throughout Range 601, NO movement is authorized in this area. Additionally, no ordnance other than sensitive fused munitions may be dropped or fired (no MK-80 series bombs, etc.) due to the potential for scattering hazardous ordnance outside of Range 601. Additional information is included in Appendix B.

9006. OBSERVATION POSTS CRAMPTON, HIDALGO (CREOLE), ROUND, AND CROSS. Use of these OP's must be scheduled in advance with Range Scheduling. The area surrounding both solar panels on OP Crampton can be used only with approval from the Dir, O & T. Proper police call of the OPs is required to include excrement.

9007. SELF FIVE MILE ARC CONTROL ZONE. Use of indirect fire weapons and explosives to include all pyrotechnics, is not authorized within the area encompassed by a five statute mile arc around the SELF originating at the SELF control tower. The use of mortars on Range 106 is excluded from this restriction. Requests for deviations from this restriction will be reviewed by the Dir, O & T on a case-by-case basis. Appendix K contains additional information for SELF operations.

9008. WISS (RANGE 603). The Weapons Impact Scoring System range is located within the Bullion training area bounded by grid coordinates PU058057, PU077057, PU058035, and PU0078035. The range consists of two buildings containing the range equipment and the WISS target. No ordnance is authorized within this area except inert aviation ordnance impacting on the WISS target. The fenced buildings are off limits. The 100 meter circle surrounding the target is restricted from transit by personnel and vehicles. Procedures for the use of the WISS are provided in Appendix B.

9009. MINE SHAFTS

1. There are many abandoned mines located throughout the RTA. These open shaft mines and diggings are extremely dangerous and shall not be entered. Any unit locating an unmarked open shaft mine or digging should notify the ROO. The ROO will then direct the RTAMS personnel to secure the mine shaft with barbed wire.
2. The collection of artifacts and souvenirs from mine shafts and diggings (which might have historical significance) is prohibited by law.

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CHAPTER 10

ENVIRONMENTAL AFFAIRS

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CHAPTER 10

ENVIRONMENTAL AFFAIRS

10000. HUNTING. Hunting aboard the Combat Center is prohibited.

10001. ROCK HUNTING/ARCHAEOLOGICAL STUDIES. The desert contains substantial mineral deposits and cultural resources. Searching for or collecting these deposits and cultural resources aboard the Combat Center is prohibited. Violators will be prosecuted per federal, state, and military law. Requests from scientific or educational groups for research or educational purposes will be considered on a case-by-case basis. Such requests should be forwarded to the Head, Natural Resources and Environmental Affairs.

10002. GRAFFITI. Absolutely no graffiti will be placed on mountains, rocks, any portion of the natural environment, or on any targets, buildings, etc.

10003. ENVIRONMENTAL PROTECTION. All federal, state, and local environmental protection regulations are applicable to units training aboard MCAGCC. Training areas and land use restrictions must be considered in operational staff planning, while hazardous material and waste management must be considered as a basic logistical requirement. As a rule, material taken into a RTA is to be removed from the RTA. The CCO 5090 series of directives provide specific guidance in adherence to these regulations. The following paragraphs highlight significant environmental areas of concern, but are not a comprehensive list of all requirements.

1. Spill Prevention, Containment and Clean-Up. Prevention of petroleum, oil, and lubricants (POL) and hazardous material spills with the resulting environmental damage is the responsibility of all commanders. The following preventive measures must be taken to reduce the chance of a spill:

a. Hoses, nozzles, and connections should be checked frequently to avoid leakage of fuel. Nozzles and connections will have an impermeable liner under each of them.

b. Refueler operators shall stay with the vehicle during refueling operations.

c. Tanker vehicles shall be parked in such a manner as to avoid the possibility of spilled fuel entering natural or man-made drainage systems. Vehicles will have an impermeable liner under them during refueling operations.

d. Power generators and other equipment prone to leakage shall have containment berms and liners beneath them while operating.

2. In the event of a spill or discharge of a hazardous substance the following reporting procedures will be adhered to:

a. 1-5 gallons.

(1) During Working Hours: Contact Compliance Enforcement Section (CES), NREA at ext. 5200/6603 or through the Center Fire Department or BEARMAT (49.85)

(2) After Working Hours: Contact CES utilizing the Center Fire Department or BEARMAT.

b. Over 5 gallons.

(1) Camp Wilson - Contact CES and Center Fire Department.

(2) SELF - Contact Crash Fire Rescue (CFR) and CES.

(3) RTAs - Contact CES through BEARMAT (49.85).

c. Affected unit shall provide personnel and equipment support for spill containment and clean-up.

3. Dumping of fuel, oil, acids, paint, etc., is prohibited.

4. Garbage shall not be buried or burned. Dispose of all trash and garbage at Combat Center Land Fill or dumpsters located at Camp Wilson.

5. Holes dug for tactical purposes shall be filled in prior to clearing the RTA. Surfaces will be returned to the most natural state possible.

6. Unused ammunition shall be turned in per unit SOPs. AMMUNITION WILL NOT BE BURIED OR OTHERWISE LEFT IN RTAS AND ON RANGES.

10004. WATER SYSTEMS AND WELLS

1. The Water Systems Project located within the Sand Hill RTA is a no entry area (paragraph 9002.10). This area supplies water to the Combat Center. The water pipes, pumps, and electrical wires in this area may be easily damaged. Use of roads through this area is prohibited.

2. There are numerous wells located in the RTAs. If a unit discovers one that is not marked, please mark, and notify NREA as to its grid location. Place a 10 meter no fire and maneuver buffer around the well head. Well sites are located in the following training areas:

a. Sand Hill RTA. There are 37 wells located in this RTA;

b. Mainside. Grids NT87118437, NT86328508;

c. Gypsum Ridge RTA. Grids NU76200076, NT76119834, NT76359765, NU72840028;

d. Emerson Lake RTA. Grids NU59670334, NU59260655, NU59610585, NU59540156, NU59710697;

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- e. East RTA. Grid NT88699116;
 - f. Blacktop RTA. Grids NU89252467, NU88532565;
 - g. Lavic Lake RTA. Grid NU57903749;
 - h. Lava RTA. Grid NU97550890
 - i. Range RTA. Grid NT85049212, NT85629241, NT85749232, NT85889236, NT85979234;
 - j. West RTA. Grid NU82839230;
 - k. Acorn RTA. Grid NU64590171, NU60499841,
3. The ESB settling pools are located in the vicinity of grid NT78399716. Sewage lines connecting the exercise support base and the pools are buried in a line between grids NT78319736 and NT78479565. To protect the pools and sewage lines, an area enclosed by grids NT78329575, NT78319760, NT78889760, and NT78589551 is established as a no-entry, no-maneuver area by wheeled and tracked vehicles.

10005. HISTORICALLY SIGNIFICANT SITES

1. Petroglyph Sites located in the Lava RTA (paragraph 8002.2) contains Indian rock art 2,000-10,000 years old, and these petroglyphs are protected by Federal law. It is unauthorized for any personnel to climb on, deface, paint, chip, or in any way destroy them.
2. Lavic Lake RTA (paragraph 9002.3) contains protected archeological sites and other cultural resources and it is unauthorized for any personnel to climb on, deface, paint, chip, or in any way destroy them.
3. In addition to the petroglyph sites located in Lava and Lavic Lake RTAs, the following areas are of significant historical interest:
 - a. Emerson Lake RTA - Grid NU603076 (Ames Well). This is a possible future historical site. Grid NU612072 (VIP Bleachers). A 100 meter buffer is established around each of these sites to protect them from possible damage.
 - b. The Surprise Spring Archaeological Area (paragraph 9002.8) is of great archaeological significance and is being preserved for study and evaluation. In order to effect preservation, ALL entry, to include infantry, vehicle maneuver and recreation is prohibited.
 - c. The collection of cultural resources from mine shafts and diggings (which might have historical significance) is prohibited by federal, state and DOD laws, rules, and regulations.

10006. WILD LIFE AND THE DESERT TORTOISE

1. General. The Combat Center is located in the California Desert Conservation Area. While all wildlife aboard MCAGCC is protected, the desert tortoise is the Only federally listed species native to the Combat Center, and may be found in all RTAs. It is prohibited by federal law to harass, harm, hunt, shoot, wound, kill,

trap, capture, collect a desert tortoise, or attempt to engage in any such conduct. This includes significant habitat modification. If a desert tortoise is encountered during training, it must be avoided. Measures are being taken to ensure protection for the tortoise on MCAGCC. Range Safety Inspectors and NREA Division personnel shall ensure that all units utilizing the Combat Center for training adhere to the rules and regulations protecting the tortoise.

2. Tortoise Nesting Site. The Tortoise Nesting Site is located at grids NT648983 to NT643975 to NT645968 to NT645944 to NT709944 to NT7622974 to NT758978 to NT729962 to NT719959 to NT710968 to NT709976 to NT703986 to NT679982 within the Sand Hill RTA. This area is restricted to all personnel, and travel is restricted to established MSRs. No cross country travel, foot traffic, live fire, or bivouac is allowed in this area.

3. Areas of Reported Desert Tortoise Activity. Protection of the threatened desert tortoise is of utmost concern to the Combat Center. Measures are being taken to ensure protection of the tortoise on MCAGCC. Local Natural Resources personnel will ensure that all units that utilize the Combat Center for training adhere to the rules and regulations protecting the tortoise. The following locations have been designate as tortoise study plots and are off limits to all live fire and maneuver:

- a. Emerson Lake. Grids NU550050 to NU550060 to NU560060 to NU560050;
- b. Sand Hill. Grid NT649922 to NT649932 to NT659932 to NT659922.

10007. VEGETATION. Vegetation is required for all desert life and it shall not be disturbed or run over unnecessarily.

10008. BIVOUAC AREAS. To the extent possible, bivouac areas should be returned to original condition (all holes must be filled to prevent desert tortoise from becoming trapped, trash removed, including comm wire, etc) upon completion of training.

10009. CAMOUFLAGE NETTING. All camouflage netting aboard MCAGCC will be erected so that its lower edges will not extend below two feet from the ground to prevent tortoise entanglement.

10010. FIRES. There is no open burning of fires authorized at MCAGCC. Waivers for open fires will be per CCO 11320.2B. The only exceptions are:

- 1. Artillery Powder Bags
- 2. Mortar increments
- 3. Actual Survival Situation

10011. PORTABLE TOILETS. Toilets are required when ten or more individuals occupy the same area for more than 24 hours. Portable toilets are recommended wherever and whenever a unit trains aboard MCAGCC as a quality of life issue and especially when units are of mixed gender.

SOP FOR RTAA

APPENDIX A

ACRONYMS/ABBREVIATIONS

<u>LONG TITLE/MEANING</u>	<u>ABBREVIATIONS</u>
Above Ground Level.....	AGL
After Working Hours	AWH
Air Traffic Controller Assigned Airspace...	ATCAA
Air Officer; Aerial Observer.....	AO
Air Tasking Order.....	ATO
Air support coordination exercise.....	ASCEX
Air-to-ground missile.....	AGM
Aircraft control area.....	ACA
Airfield identifier for SELF	NXP
American National Standard Institute	ANSI
Assault amphibian vehicle.....	AAV
Anti-radiation missile	ARM
Anti-tank weapon.....	AT-4
Armor moving target carrier	AMTC
Armor target kill simulator.....	ATKS
Assault landing zone	ALZ
Attack position.....	AP
Aviation combat element.....	ACE
Ballistic aerial target.....	BAT
Battery center.....	BC
Bureau of Land Management.....	BLM
Caliber.....	cal
Chemical Spray.....	CS
Class "D" Surface Area.....	CDSA

SOP FOR RTAA

Cluster bomb unit.....	CBU
Combat Service Support Detachment.....	CSSD
Combat Center Order.....	CCO
Combined arms exercise.....	CAX
Command post exercise.....	CPX
Command duty officer.....	CDO
Command post	CP
Contract Surveillance Team.....	CST
Crash Fire Rescue.....	CFR
Defense Reutilization and Marketing Office.	DRMO
Defense Switching Network.....	DSN
Department of Defense Identification Code .	DODIC
Direct Air Support Center	DASC
Distance Measuring Equipment	DME
Drop Zone	DZ
Duel Purpose Improved Conventional Munitions.....	DPICM
During Working Hours.....	DWH
Egress Point.....	EP
Electronic Warfare.....	EW
Electronic Countermeasures.....	ECM
End of Exercise.....	ENDEX
Exercise Support Base	ESB
Expeditionary Air Field	EAF
Explosive Ordnance Disposal.....	EOD
Federal Aviation Administration.....	FAA

SOP FOR RTAA

Federal Aviation regulations.....	FAR
Final Exercise.....	FINEX
Final Protective Fires	FPF
Fire Direction Center	FDC
Fire Support Coordinator	FSC
Fire Support Coordination Application Course	FSCAC
Fire Support Coordination Line	FSCL
Fixed Wing Close air support.....	FWCAS
Fleet Marine Force Order	FMFM
Flight Information Publication	FLIP
Forward Air Controller.....	FAC
Forward Air Controller (Airborne).....	FAC(A)
Forward Arming and Refueling Point.....	FARP
Forward Observer.....	FO
Forward Edge of the Battle Area	FEBA
Forward Line of Troops	FLOT
Free Drop Zone.....	FDZ
Fuel Air Explosive	FAE
Graphical Firing Table	GFT
Ground/Vehicle Laser Locator Designator ...	G/VLLD
Ground Combat Element	GCE
Gun Target Line	GTL
Helicopter Direction	HD
Helicopter Coordinator (Airborne).....	HC(A)
High Burst-Mean Point of Impact.....	HB-MPI
High Explosive Anti-Tank	HEAT
High Explosive	HE

SOP FOR RTAA

Higher Headquarters	HHQ
High Mobility Multipurpose Wheeled Vehicle.	HMMWV
Holding Area	HA
Initial Point.....	IP
Improved Remote Engagement Target System...	IRETS
Improved Conventional Munitions	ICM
Infantry Target Mechanism	ITM
Infrared.....	IR
Instrument Flight Rules	IFR
Kilometer	KM
Landing Zone	LZ
Laser Guided Bomb	LGB
Laser Designator	LD
Laser Target Designator.....	LTD
Laser Spot Tracker.....	LST
Laser System Safety Officer	LSSO
Laser Safety Officer	LSO
Laser Infrared Observation Set	LIOS
Laser Target Line	LTL
Letter of Agreement	LOA
Low Altitude Air Defense.....	LAAD
Low Altitude Tactics Training.....	LATT
Light Anti-Armor Weapon	LAAW
Light Armored Vehicle	LAV
Line of Sight	LOS
Main Supply Route	MSR
Marine Air-Ground Task Force	MAGTF

SOP FOR RTAA

Marine Air Support Squadron.....	MASS
Marine Corps Air Ground Combat Center	MCAGCC
Marine Corps Order	MCO
Marine Wing Support Squadron	MWSS
Marine Expeditionary Unit.....	MEU
Marine Expeditionary Force	MEF
Marksmanship Training Unit	MTU
Mean Sea Level/Minimum Safe Line/ Minimum Safe Limit	MSL
Medical Evacuation	MEDEVAC
Meteorological.....	MET
Meter	m
Miles per Hour	MPH
Miliradian.....	mr
Military Assumes Responsibility for Separation of Aircraft	MARSA
Military Police	MP(s)
Military Operating Area	MOA
Millimeter.....	mm
Missile Target Line	MTL
Missing, Lost, Stolen, Recovered Report ...	M-L-S-R
Mission Oriented Protective Posture	MOPP
Modular Universal Laser Equipment	MULE
Multiple Launch Rocket System	MLRS
Multi-Purpose Range Complex	MPRC
National Imagery and Mapping Agency	NIMA
Natural Resources Environmental Affairs ...	NREA

SOP FOR RTAA

Nautical Mile	NM
Naval Medical Command Instruction	NAVMEDCOMINST
Naval Air Training and Operating Procedures Standardization Program	NATOPS
Naval Ammunition Reporting Code	NARC
Navy Marine Corps	NAVMC
Night Observation System.....	NOS
Night Vision Goggle	NVG
No Fire Area	NFA
No Operational Radio	NORDO
Nominal Ocular Hazard Distance	NOHD
North American Air Defense System	NORAD
Not Later Than.....	NLT
Notice to Airmen	NOTAMS
Nuclear, Biological, Chemical	NBC
Observation Posts	OP
Officer Conducting Exercise	OCE
Officer Scheduling Exercise	OSE
Operational Tests and Evaluation Force Tactics Guide	OPTEVFORVXS
Operations and Training Directorate	O&T
Optical Density	OD
Outlying Field.....	OLF
Privately Owned Vehicles	POV
Provost Marshals Office	PMO
Quadrant Elevation	QE
Radar Beacon Forward Air Controller	RABFAC
Radio In and Out	RIO

SOP FOR RTAA

Range Facility Management Support System .	RFMSS
Range Training Area	RTA
Range/Training Areas and Airspace	RTAA
Range Safety Inspector	RSI
Range Safety Officer	RSO
Range Control Officer	RCO
Range Operations Officer.....	ROO
Range Residual Processing Center.....	RRPC
Return to Base	RTB
Risk Assessment Code.....	RAC
Rotary Wing Close Air Support.....	RWCAS
Range Control	BEARMAT
Sabot Light Armor Penetrator	SLAP
Search and Rescue	SAR
Secretary of the Navy Instruction	SECNAVINST
Shoulder-Launched multipurpose Assault Weapon	SMAW
Single Channel Radio	SCR
Space and Naval Warfare Instruction	SPAWARINST
Squad Automatic Weapon.....	SAW
Standing Operating Procedures	SOP
Stinger Launch Simulator	STLS
Strategic Expeditionary Landing Field	SELF
Suppression of Enemy Air Defense	SEAD
Surface-to-Air Missile	SAM
Surface Danger Zone	SDZ
Tactical Training And Exercise Control Group	TTECG

SOP FOR RTAA

Tactical Air Control Party	TACP
Tactical Air Director.	TAD
Target Acquisition and Designation System.	TADS
Tactical Air Traffic Controller.....	TATC
Target Detecting Device	TDD
Target Holding Mechanism/Tank Gunnery	THM/TG
Target Practice Discarding Sabot-Tracer ..	TPDS-T
Target Practice Tracer	TPT
Target Recognition Attack Multi-sensor ...	TRAM
Terrain Following.....	TERF
Training Systems Resource Management Section	TSRMS
Tube-launched, Optically-tracked, Wire- guided Missile	TOW
Unmanned Aerial Vehicle.....	UAV
Unmanned Aerial Vehicle Traffic Area	UAVTA
Universal Transverse Mercator.....	UTM
Vertical Elevation	VE
Very Important Person	VIP
Visual Meteorological Conditions	VMC
Visual Flight Rules	VFR
Weapon Impact Scoring System	WISS
Weapons Target Line	WTL
Wet Bulb Globe Temperature	WBGT
White Phosphorus.....	WP

SOP FOR RTAA

APPENDIX B

RANGES

<u>NUMBER</u>	<u>TYPE OF RANGE</u>	<u>PAGE</u>
100	SQUAD MANEUVER RANGE (LAND NAVIGATION, NONLIVE).....	B-3
101	ARMOR, GUN TRAINING RANGE (MINIATURIZED SCALE).....	B-4
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601	SENSITIVE FUSED MUNITIONS RANGE (RAINBOW CANYON).....	B-35
603	WEAPONS IMPACT SCORING SYSTEM (WISS) (BULLION).....	B-37
605	DOOR GUNNER RANGE....(BULLION).....	B-38
607	STRAFE RANGE..... (BULLION).....	B-39

INTRODUCTION

The following general instructions apply to all numbered ranges unless otherwise specified in the Special Instructions for that particular range:

1. Ranges are scheduled through Range Scheduling per paragraph 2001.
2. A corpsman and a safety vehicle will be present during all periods of live fire.
3. Helmets, flak jackets, and hearing protection will be worn on the firing line by all personnel per paragraphs 3011 and 3012.
4. Positive two-way communications with BEARMAT is required before live fire may commence.
5. BEARMAT must approve all requests to commence live fire.
6. Live fire will cease immediately if communications with BEARMAT is lost.
7. A Range Safety Inspector will brief the RSO at the range prior to any live fire. An Inspector must check the range after training is completed and a thorough police call has been held.
8. The CO/OIC/RSO is responsible for ensuring that all fires and effects of fire remain within the lateral limits of assigned range.
9. Bivouacking on numbered ranges is not permitted without specific prior approval per paragraph 6002.5.
10. Many of the Combat Center's numbered ranges have been designed for a specific purpose and should be utilized for that purpose only (paragraph 2000.1b).

NOTE: EACH RANGE IS DESCRIBED IN THE FOLLOWING PAGES.

SOP FOR RTAA

RANGE 100

Type: Squad Maneuver Range (Land Navigation, Nonlive)

Location: East RTA from NT87229075 east to NT88029090 southeast
88678725 to NT89478885 southwest to NT89388750 west to
and north to NT87229075

Allowable Weapons: v M-16 rifle with BFAs
v M-249 SAW with BFAs
v M-60/M0240G Machine Guns equipped with BFAs

Allowable Munitions: v Blank ammunition only
v Trip flares
v Flash bangs
v Pop-ups
v Smoke grenades

Direction of Fire: N/A

Maximum Range: N/A

Left Lateral Limits: N/A

Right Lateral Limits: N/A

Range Facilities: Nine different situations are presented to the squad
as they progress through the range. The nine
situations are as follows:

1. Enemy agent
2. Minefield
3. Electronic Warfare (Jamming)
4. NBC (Contaminated area)
5. BMP
6. Tanglefoot
7. T-62
8. LOG Vehicle obstacle
9. SAM & Radar site

Special Targetry: N/A

Special Instructions: 1. Units will notify BEARMAT prior to firing blanks or
pyrotechnics.

2. Units desiring to use this range for a force march must
schedule this use through Range Scheduling.

SOP FOR RTAA

RANGE 101

Type: Armor, Gun Training Range (Miniaturized Scale)

Location: Range RTA, grid NT83229370 to NT83129375

Allowable Weapons: v M-16 Brewster device (5.56)
v M-240 (Sub-Cal configuration)
v Telfare device (.50 cal)

Allowable Munitions: v 5.56mm
v 7.62
v .50 cal

Direction of Fire: Northeast

Maximum Range: 3,000 meters

Left Lateral Limit: Grid 0572 mils, 032 magnetic: 0342 mils, 019

Right Lateral Limit: Grid 0890 mils, 050 magnetic: 0660 mils, 037

Range Facilities: v Berm
v Firing line markers
v Lateral limit markers
v Surveyed firing points for 1,200m, 1,500m and 2,000m
v Bore sighting pad capable of accommodating three armored vehicles
v Small arms BZO range (See next page)

Special Targetry: N/A

Special Instructions: 1. Tables I through V can be fired on this range.
2. During firing no personnel will be allowed forward of the range finders end housing.
3. A safety NCO will be located on every armored vehicle.
4. This is a LASER certified range.
5. Limited POV parking for SNCO/Officers only.
6. Telephone (ext.368-7874) located at entrance to range.
7. Units are required to furnish their own targets.

SOP FOR RTAA

Range 101A

Type: Small Arms Battle Sight Zero (BZO)

Location: Range RTA, Grid 830937

Authorized Weapons:

- v M9 Pistol
- v M16A2
- v M249 (SAW)
- v 12 Gauge shotgun

Authorized Munitions:

- v 9MM (all DODICs) M9 pistol
- v 5.56MM (all DODICs)
- v 12 gauge (all DODICs)

Direction of Fire: Northeast

Maximum Range: 50 meters (Confines of Berm)

Range facilities: 50 meter containment berm

Special Targetry: None

Special Instructions:

1. Users must provide own targets
2. All rounds must impact inside the containment berm
3. The BZO berm is to the left side of the armor sub-cal range.

SOP FOR RTAA

RANGE 102

Type: Land Navigation

Location: West RTA, vicinity of oasis

Allowable Weapons: N/A

Allowable Munitions: N/A

Direction of Fire: N/A

Maximum Range: N/A

Left Lateral Limits: N/A

Right Lateral Limits: N/A

Range Facilities: 30 Numbered monuments

Special Targetry: N/A

Special Instructions: 1. Units will establish their own course using the existing monuments.

2. Emergency vehicles only on the course.

Grid coordinates for the monuments are:

102-001 --- 8214 9446	102-011 --- 8206 9423	102-021 --- 8189 9391
102-002 --- 8187 9459	102-012 --- 8112 9424	102-022 --- 8162 9399
102-003 --- 8146 9455	102-013 --- 8141 9416	102-023 --- 8162 9399
102-004 --- 8106 9457	102-014 --- 8115 9424	102-024 --- 8133 9389
102-005 --- 8082 9445	102-015 --- 8090 9414	102-025 --- 8082 9390
102-006 --- 8058 9459	102-016 --- 8070 9425	102-026 --- 8049 9401
102-007 --- 8031 9455	102-017 --- 8044 9424	102-027 --- 8211 9371
102-008 --- 8010 9462	102-018 --- 8010 9421	102-028 --- 8191 9365
102-009 --- 7976 9464	102-019 --- 7989 9436	102-029 --- 8162 9367
102-010 --- 7942 9464	102-020 --- 8217 9401	102-030 --- 8172 9341

SOP FOR RTAA

RANGE 103

Type: Squad Defensive Fire Range (Automated)

Location: Range RTA, grid NT819942

Allowable Weapons:

- v M-16
- v M-249 SAW
- v M-203 grenade launcher
- v M-40A1 sniper rifle
- v 60mm Mortar

Allowable Munitions:

- v 5.56mm
- v 7.62mm (Sniper rifle M-40A1)
- v 40mm (Illumination only)
- v 60mm (Illumination only)
- v WSC

Direction of Fire: Northeast

Left Lateral Limits: Grid: 0650 mils, 036 deg, mag: 0420 mils, 023 deg

Right Lateral Limits: Grid: 1218 mils, 068 deg, mag: 0989 mils, 055 deg

Range Facilities:

- v Firing berm with 12 pre-positioned fighting positions
- v Range control tower with observation platform
- v Sun shade

Special Targetry:

- v 144 stationary pop-up infantry targets
- v 12 moving infantry pop-up targets

Special Instructions:

1. Range 103 is a contractor operated range. This range should be scheduled at least five working days prior to intended use.
2. The RSO should coordinate with TSRMS to develop target engagement scenarios.
3. Two safety NCOs are required on the firing line whenever live fire is being conducted.
4. Individual night vision devices are authorized for use on this range.
5. The telephones located on the range (tower -ext-7029 gate - 7873) are intended as alternate means

- The RSO will be located on the observation platform of the Range Control Tower and will maintain control of and communications with the firing line.

SOP FOR RTAA

7. Vehicles are prohibited on the firing line berm.
8. Prior coordination between Range Scheduling and the SELF is required before the use of any pyrotechnic device or illumination.
9. Limited POV parking for SNCOs/Officers ONLY.
10. 60mm mortars will be placed in designated positions on the right flank of the range.

SOP FOR RTAA

RANGE 104

Type: Anti-mechanized/Grenade Range

Location: Range RTA, grid NT820949

Allowable Weapons:

- v M-203
- v Hand Grenades
- v M-72 LAW
- v M-47 DRAGON
- v SMAW
- v AT-4

Allowable Munitions:

- v 40mm (M-203), all DODICs (Except CS)
- v Grenades - G811, G878, G881, G911
- v LAW - H557, H708
- v DRAGON - PL22, PL23, PM80 (DRAGON II)
- v SMAW - HX04, HX05, HX06, HX07, AX11
- v AT-4 - C995, A358

Direction of Fire: Northeast

Maximum Range: 1,650 meters

Left Lateral Limits: Grid: 0122 mils, 007 deg mag: 6296 mils, 356 deg

Right Lateral Limits: Grid: 1310 mils, 074 deg mag: 1080 mils, 061 deg

Range Facilities:

- v Firing berm with concrete hand grenade throwing bunkers
- v Control berm with command bunker
- v Practice grenade bunkers in troops assembly area
- v Bunkers for Missile Systems
- v Targets are hulks from 200 meters to 1,100 meters

Special Targetry: N/A

Special Instructions:

1. Only one weapon system will be employed at a time.
2. The LAAW, SMAW, DRAGON and AT-4 will be fired on command of the RSO.
3. Safety NCOs must have instruction on the safe usage of each weapon to be fired prior to assignment.
4. BEARMAT will be notified prior to the first grenade being thrown.
5. Hand grenades will be thrown individually on command from the RSO.

SOP FOR RTAA

6. If a hand grenade fails to function and becomes a UXO, stop all operations and inform BEARMAT. Do not throw additional hand grenades or attempt to disarm a UXO. Do not leave berm, keep all personnel in grenade pits for safety. EOD personnel will be dispatched by BEARMAT. After a mandatory 30 minutes waiting period, the EOD personnel will clear the UXO and release the range back to the RSO.
7. The M-203 may be fired at will, once the RSO has given the command to commence firing.
8. The RSO will be located in the command bunker on the control berm.
9. All personnel not required on the firing line will remain behind the protective berm (practice grenade berm) to the rear of the firing line.
10. Prior coordination between Range Scheduling and the SELF is required before the use of any pyrotechnic device or illumination.
11. The use of B534 and B567/B537 (APERS, CS) on this range is impractical and is not recommended for use.
12. Grenades will not be thrown at night; grenade throwing will cease one half hour prior to sunset.
13. The telephone located at the gate (ext-7877) is for administrative and emergency use. Radio is the primary means of communications with BEARMAT.

SOP FOR RTAA

RANGE 105

Type: Gas Chamber

Location: Range RTA, grid NT815958

Authorized Weapons: None

Authorized Munitions: K765 (CS Capsules)

Direction of Fire: N/A

Maximum Range: N/A

Left Lateral Limits: N/A

Right Lateral Limits: N/A

Range Facilities: v Gas Chamber
v Bleachers
v Deliberate decon Ops Site
v Mission Oriented Protective Posture (MOPP) Exchange

Site v Vehicle Wash Down Site
v Small Arms BZO range (See 105A)

Special Targetry: N/A

Special Instructions: 1. A primary 5702/5711 must be present to conduct NBC training.

2. Conduct all training per Marine Corps NBC regulations.

3. Range Safety has the keys to the chamber and will put units on and off of this range.

SOP FOR RTAA

RANGE 105A

Type: Small Arms BZO

Location: Range RTA, grid 814960

Authorized Weapons: v M16A2
v M249 SAW
v M240G
v M-2

Authorized Munitions: v 5.56MM (all DODICs)
v 7.62MM (all DODICs)
v 50 cal (Ball and Tracer only)

Direction of Fire: Northeast

Maximum Range: 50 Meters (confines of berm)

Range Facilities: v 50 meter containment berm
v Target frames

Special Targetry: None

Special Instructions: 1. Units must provide and remove own targets
2. Units must repair any damage to target frames
3. All rounds must impact within the containment berm
4. Units must repair excessive damage to berms caused by round impacts
5. 50 caliber SLAP, ARMOR PIERCING, OR INCENDIARY are not authorized on this range.

SOP FOR RTAA

RANGE 106

Type: Mortar Range

Location: Range RTA, grid NT81429630 to NT81179648

Allowable Weapons: v 60mm Mortar
v 81mm Mortar

Allowable Munitions: v 60mm (All DODICs)
v 81mm (All DODICs except C850, C851, C852 (CHAFF))

Direction of Fire: Northeast

Maximum Range: 3,500 meters (Min range 500 meters)

Left Lateral Limits: Grid: 0409 mils, 023 deg mag: 0179 mils, 010 deg

Right Lateral Limits: Grid: 1029 mils, 058 deg mag: 0799 mils, 045 deg

Range Facilities: v Observation Tower
v Firing line markers
v Lateral limit markers
v Targets from 800 meters to 2,000 meters

Special Targetry: N/A

Special Instructions: 1. Safety NCOs will be located at each mortar position.
2. See the reference for specific safety instructions.
3. Use of illumination must be coordinated with Range Scheduling and the SELF prior to use.

SOP FOR RTAA

RANGE 107

Type: Infantry Squad Assault Range

Location: Range RTA, grid NT80739730 to NT80149862

Allowable Weapons:

- v M40A1 sniper rifle
- v M-16
- v M-203 grenade launcher
- v M-249 SAW
- v 60mm Mortar
- v pyrotechnics

Allowable Munitions:

- v 5.56mm - All DODICs
- v 7.62mm (M-14, M40A1)
- v 40mm - B535, B536 (Illumination only)
- v 60mm - B627, B647 (Illumination only)
- v pyrotechnics (All DODICs)

Direction of Fire: Northeast

Maximum Range: 3,000 meters

Left Lateral Limits: Grid: 0851 mils, 048 deg, mag: 0621 mils, 035 deg

Right Lateral Limits: Grid: 1565 mils, 088 deg, mag: 1335 mils, 075 deg

Range Facilities:

- v Range Tower
- v Fully automated targetry
- v Sun shade

Special Targetry:

- v 4 Moving Pop-up targets
- v 46 Stationary Pop-up targets

Special Instructions:

1. Range 107 is a computer controlled, contractor run range.
2. Range 107 is scheduled in eight hour blocks, and requires five working days scheduling in advance.
3. The OIC/RSO should contact TSRMS to develop target engagement scenarios.
4. Additional communications assets are required. Five radios are recommended.
5. Prior coordination between Range Scheduling and the SELF is required before the use of any pyrotechnic device or illumination.
6. A dry run is required prior to any live fire.

SOP FOR RTAA

RANGE 108

Type: Infantry Squad Battle Course

Location: Range RTA, grid NT793995

Allowable Weapons: vM-16
vM-203 grenade launcher
vM-249 SAW
vM-60/M-240G Machine Gun
vSMAW
vAT-4
vPyrotechnics
v60mm Mortars

Allowable Munitions: v5.56mm (All DODIC's)
v7.62mm (All DODIC's)
v40mm - B475, B477, B504, B508, B509, B519, B534, B535,
B536
vSMAW - HX04, HX07, AX11
vAT-4 (INERT)
vPyrotechnics
v60mm illumination only

Direction of Fire: East-Northeast

Maximum Range: 1000 meters

Left Lateral Limits: TBD

Right Lateral Limits: TBD

Range Facilities: Control Tower, Field Service Head, Covered Mess,
Operations Classroom/Storage Building

Special Targetry: The range is divided into five zones:

Zone A consists of four stationary infantry targets (SIT) simulating a Soviet outpost position, one observation bunker, and four mortar simulation devices (MSD). Zone A is sited approximately 100 to 300 meters downrange on a ridgeline to be engaged from a frontal suppressing engagement and a lateral (flanking) defeating engagement.

Zone B is the final objective and consists of two groupings with three SITs and a single infantry moving target (IMT) in each grouping. An enemy trench, a stationary armored target (SAT), and an observation bunker are also located in each grouping of the zone. One armored moving target carrier (AMTC) and three MSDs are also located in this objective. The targets in Zone B are sited downrange approximately 550 to 900 meters from the baseline.

SOP FOR RTAA

Zone C is the enemy counterattack force that repels squad advancement into zone C. Zone C consists of two SATs, three SITs, two MSDs, and an observation bunker. Zone C is located approximately 300 to 450 meters downrange.

Zone D is another counterattack force. This zone consists of four SITs, two IMTs, one SAT, and three MSDs. The location of this counterattack position is approximately 300 to 450 meters downrange from the baseline.

Zone E is also a counterattack force. The location of this zone is approximately 450 to 500 meters downrange. This position consists of five SITs, two IMTs, one SAT, one observationbunker, and two MSDs.

Special Instructions:

1. Range 108 is a contractor run computer control range and should be scheduled a minimum of five working prior to use.
2. The OIC/RSO must contact TSRMS to develop target engagement scenarios.
3. All tow/dragon wires must be policed by the firing units.
4. Head and classroom will be opened by Range Safety when checking out the range. Head and classroom will be inspected by Range Safety and will be cleaned by the using unit prior to departure from the range.
5. Additional comm requirements are required between firing line and tower.
6. Mortar firing positions: Left NT79589875 and right NT79769834.
7. Prior coordination between Range Scheduling and the SELF is required before the use of any pyrotechnic device or illumination.

NOTE: THE WOODEN OBSERVATION BUNKERS ARE NOT TO BE ENGAGED BY LIVE FIRE.

SOP FOR RTAA

RANGE 109

Type: Anti-Armor Live Fire Tracking Range

Location: Range RTA, between grids NT793995 and NT787031

Allowable Weapons: v M-47 DRAGON (Inert)
v TOW (Inert)
v LAV
v MK-19
v AT-4
v SMAW
v M2

Allowable Munitions: v DRAGON - PL22 (Inert)
v TOW - PB-95, PB-96, PB-99 (Inert)
v 25mm Chain Gun - A976, G826, G815, A910
v MK-19 - B480, B576
v AT-4 (INERT)(9mm spotter round)
v SMAW - HX04, HX07, AX11 (inert)
v M-2 (All DODICs)

Maximum Range: 3,750 meters

Left Lateral Limits: Grid: 1283 mils, 072 deg, mag: 1053 mils, 059 deg

Right Lateral Limits: Grid: 1371 mils, 077 deg, mag: 1142 mils, 064 deg

Range Facilities: v Control Tower
v 2 firing berms
v 4300 meters of tracking road
v Support facilities (head, bleachers, loading dock, etc.)
v Classroom

Special Targetry: v 4 Moving Armor Targets
v 8 Stationary Armor Targets

Special Instructions: 1. Range 109 is a contractor run, computer controlled range and should be scheduled a minimum of five worki days prior to use.

2. Wheeled vehicles only will use the tracking roads. No firing from tracking roads.

3. Vehicles will use the concrete firing pad and ground mounted weapon systems will use the dirt berm for engaging targets.

4. Targets with ranges less than 400 meters will be engaged by AT-4 (9mm) and SMAW only.

5. The OIC/RSO must contact TSRMS to develop target engagement scenarios.

SOP FOR RTAA

6. Prior coordination between Range Scheduling and the SELF is required before the use of any pyrotechnic device or illumination.
7. Head and classroom will be opened by Range Safety when checking out range. Head and classroom will be inspected by range safety and will be cleaned prior to departure from the range.
8. Additional comm requirements are required between firing line and tower.

NOTE: UNIT IS RESPONSIBLE FOR RETRIEVING ALL MISSILE WIRE PRIOR TO DEPARTING THE RANGE.

SOP FOR RTAA

RANGE 110

Type: MK-19 Range

Location: Range RTA, grid NU776040

Allowable Weapons: v MK-19

Allowable Munitions: v 40MM MK-19 (all DODICs)

Direction of Fire: East

Maximum Range: 2,800 meters

Left Lateral Limits: Grid: 0995 mils, 056 deg, mag: 0765 mils, 043 deg

Right Lateral Limits: Grid: 1565 mils, 088 deg, mag: 1335 mils, 075 deg

Range Facilities: Firing berm

Special Targetry: N/A

Special Instructions:

1. Entry into Range 110 Special Ordnance Test Area (grids NU797050 to NU811050 to NU820030 to NU800030 and back to NU797050) or the confines between the right and left lateral limits forward of the firing berm is prohibited to all personnel except MCAGCC EOD teams.
2. The MK-19 can only be fired at the berm location.
3. When firing the MK-19, a Safety NCO must be located at each weapon.
4. No vehicles are allowed on range berms.
5. Do not train with 40mm combat ammo at ranges less than 310 meters.
6. Train with 40mm practice ammo only, between 75 and 310 meters.
7. Train to engage targets at ranges greater than 75 meters.
8. Train to avoid firing through obstructions.
9. Ballistic eyewear equivalent to sun, wind, and dust goggles (NSN 8465-01-004-2893 clear or 8465-01-109-3996 lens, ballistic, smoke gray) are to be worn at all times by the gun crew when firing the MK-19 (HE/HEDP) and by all personnel within a 310 meter radius of a potential impact.

SOP FOR RTAA

RANGE 111

Type: Course	MOUT (Military Operations in Urban Terrain) Assault
Location:	Range RTA, Vicinity of Miner's Pass Road.
Allowable Weapons:	v TBD
Allowable Munitions:	v TBD
Direction of Fire:	EAST
Maximum Range:	TBD
Left Lateral Limit:	TBD
Right Lateral Limit:	TBD
Range Facilities:	TBD
Special Targetry:	TBD
Special Instructions:	TBD

SOP FOR RTAA

RANGE 112

Type:	Range Residue Processing Area
Location:	Range RTA, the NU7906 grid square (1000m x 1000m)
Allowable Weapons:	N/A
Allowable Munitions:	N/A
Direction of Fire:	N/A
Maximum Range:	N/A
Left Lateral Limits:	N/A
Right Lateral Limits:	N/A
Range Facilities:	N/A
Special Targetry:	N/A
Special Instructions:	1. Range 112 is used by Natural Resources and Environmental Affairs for processing range residue prior to demil

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SOP FOR RTAA

RANGE 113

Type: Multi-Purpose Machine Gun Range

Location: Range RTA, Grid NU762056

Authorized Weapons: v M-249 SAW
v M-60/M-240G Machine Gun
v 60mm Mortar

Authorized Munitions: v 5.56mm - all DODICs
v 7.62mm - all DODICs
v 60mm illumination only

Direction of Fire: Northeast

Left Lateral Limits: NU764064 4135.5 mil, 345 deg mag

Right Lateral Limits: NU764061 0502.0 mil, 29.25 deg mag

Range Facilities: Tower, Ammunition Breakout Building, Covered Mess Area, Heads, and Computer Controlled Targetry

Special Targetry: Computer controlled targets from 250M to 1,000 meters. Targets are set up in ten (10) lanes with each pair of lanes (i.e. 1-2, 3-4) in a different configuration.

Special Instructions: 1. Range 113 is a contractor run, computer controlled range and should be scheduled at least five working days in advance.

2. There will be no vehicles allowed on the berm.

3. The OIC/RSO must contact TSRMS to develop target engagement scenarios.

4. Using units are responsible for the cleanliness of the head.

5. Mortar firing positions are located at Left NU76040621 and Right NU76550169.

SOP FOR RTAA

RANGE 113A

Type: Machine Gun BZO

Location: Range RTA, Grid NU 762056

Authorized Weapons: v M249 SAW
v M60/M240G Machine gun
v M-2

Authorized Munitions: v 5.56mm (all DODICs)
v 7.62mm (all DODICs)
v 50 cal (ball and tracer only)

Direction of Fire: Northeast

Maximum Range: 50 meters (confines of berm)

Range Facilities: 50 meter containment berm

Special Targetry: None

Special Instructions: 1. Units must provide and remove own targets.
2. All rounds must impact inside the containment berm.
3. Units must repair excessive damage to berms caused by round impacts.
4. 50 cal SLAP, Armor Piercing, or Incendiary rounds are not authorized.

SOP FOR RTAA

RANGE 114

Type: Combat Engineer Demolition Range

Location: Range RTA, grid NU733112

Allowable Weapons: v Demolition Materials
v Land mines

Allowable Munitions: v Demolitions (All DODICs, NOT TO EXCEED 100 LBS NEW)
v Mines (K092, K143, K180, K181, K250)
v Line charge (All DODICs)

Direction of Fire: Northwest

Maximum Range: 1,000 meters

Left Lateral Limits: N/A

Right Lateral Limits: N/A

Range Facilities: Bunker

Special Instructions: 1. Line charges are authorized on Range 114. When using line charges, additional road guards need to be placed at the following grid locations: NU739093 and NU737117.

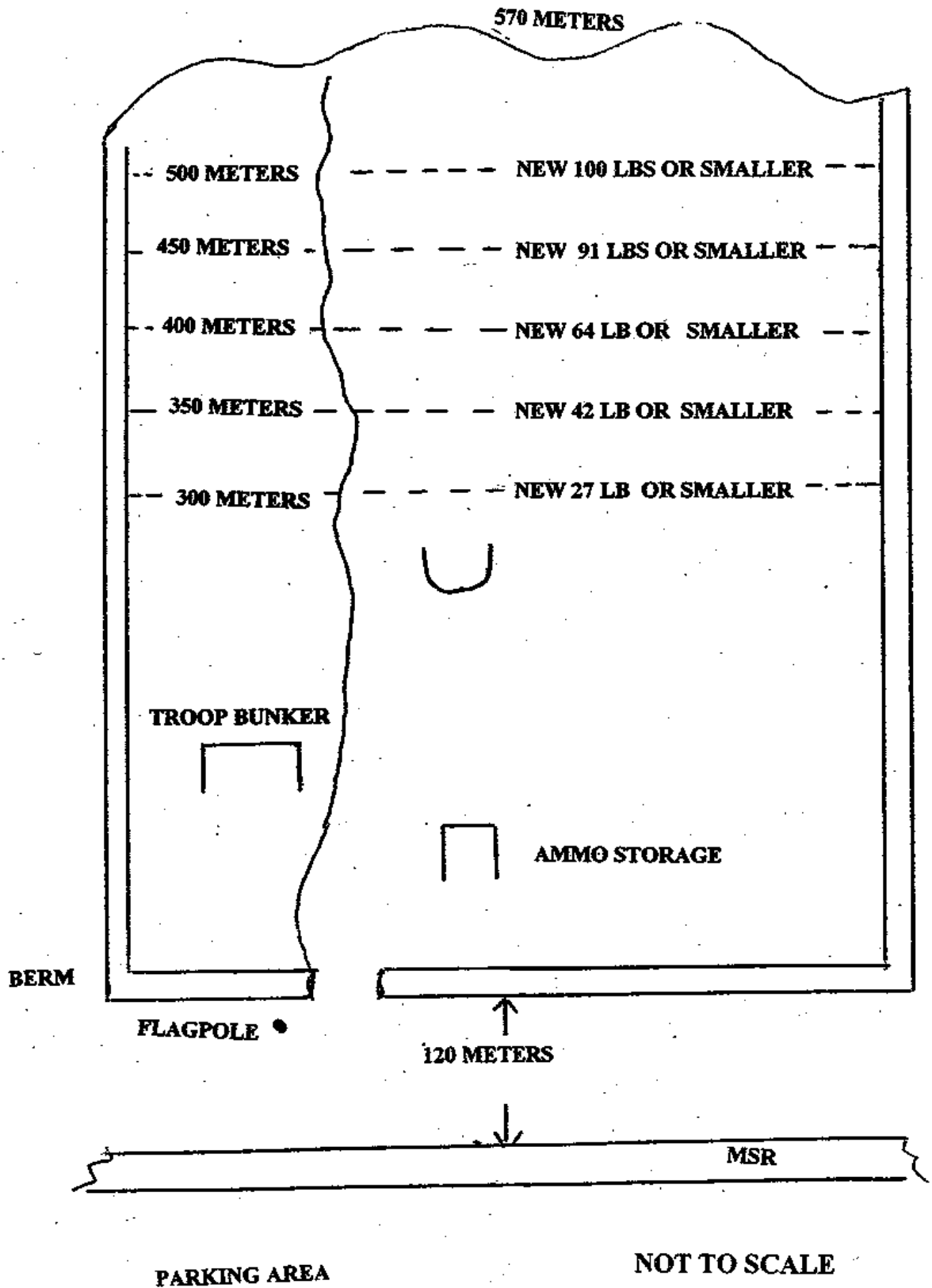
2. All training at Range 114 will be accomplished in strict compliance with the safety procedures outlined in the reference, FM 5-250, FM 20-32, and this Manual.

3. Claymore mines are authorized. Command detonated only.

4. All personnel participating in a demolition shot will be in the bunker when the explosive is detonated. All non-participating personnel will be behind the berm located at the entrance to the range. At no time will anyone expose themselves to possible harm from the detonation or possible missiles.

5. Demolition shots will be emplaced at least 300 meters from nonparticipating personnel for twenty-seven pounds net explosive weight (NEW) or less. For NEW greater than twenty-seven pounds, the distance will be determined by formula in FM 5-250. All shots will be detonated in designated firing areas.

6. All explosives will be used for their intended purpose.



SOP FOR RTAA

RANGE 400

Type: Company Fire and Maneuver Range

Location: Cleghorn Pass RTA, grid NT932962 to NT947963 to NT948972 to NT940987 to NT933977 to NT932962

Allowable Weapons:

- v M-16
- v M-249 SAW
- v M-60/M-240G Machine Gun
- v M-2 .50 cal Machine Gun
- v 60mm Mortar
- v 81mm Mortar (all DODICs except C875)
- v MK-153 SMAW
- v M-47 DRAGON
- v AT-4
- v MK-19
- v M-203 grenade launcher
- v Practice hand grenades
- v Pyrotechnics
- v Demolitions
- v Bangalore Torpedoes

Allowable Munitions:

- v 5.56 (all DODICs)
- v 7.62 (all DODICs)
- v 50 Caliber (all DODICs)
- v 60mm mortars (all DODICs)
- v 81mm mortars (all DODICs, except C-875)
- v SMAW - HX04, HX05, HX06, HX07, AX11
- v M-47 DRAGON - PL22, PL23
- v AT-4 - C995
- v MK-19 - B-480, B-576
- v M-203 - B534, B504, B535, B536, B475, B477, B508, B509, B519
- v Practice Hand Grenade - G811, G878
- v Pyrotechnics (all types)
- v Demolitions
- v Bangalore Torpedoes

Direction of Fire: North, Northwest, Northeast (Axis of advance - North)

Maximum Range: 2,000 meters

Left Lateral Limits: Grid NT936954

Right Lateral Limits: Grid NT949956

Range Facilities:

- v 10 trench lines approximately 60m in length supported by 10 BMP tire targets
- v Two 120mm mortar tire targets
- v A minefield

SOP FOR RTAA

- v Infantry silhouettes
- v Machine-gun bunkers
- v Wire obstacles containing antitank and antipersonnel mines
- v Two observation points and two LZs (LZ-11 and LZ-11A) are located at Range 400

Special Targetry: N/A

- Special Instructions:
1. This range is designed to provide a rifle company the opportunity to conduct a live fire attack on a Soviet-style strongpoint which requires the employment of all available supporting arms.
 2. The terrain is rocky and located in a wide draw which narrows from over 1,000 meters wide to only 200 meters.
 3. Heavy machine guns, 81mm mortars, DRAGONS, tanks (machine guns only), AAVs, LAVs, and engineers may be used to support the attack.
 4. Range 400 must be specifically requested. Requesting the use of Cleghorn Pass RTA does not entitle the requester use of Range 400.
 5. All discarded MK-153 SMAW tubes and all fiberglass launch tubes will be returned to the Center Magazine Area.
 6. Only two of the three enemy platoon positions will be attacked at any one time.
 7. Bangalore torpedoes and demolitions may be utilized to create a foot or vehicle path through the minefields and wire obstacles.
 8. The materials for rebuilding the range may be obtained from RTAMS. Units will reimburse RTAMS for these materials.
 9. Coordinate with EOD for range sweep prior to leaving the range.
 10. Only the safety inspector can secure the unit from the range.

NOTE: UNITS OTHER THAN CAX FORCES ARE REQUIRED TO REBUILD THE RANGE UPON COMPLETION OF TRAINING. UNITS SHOULD ALLOW AT LEAST ONE DAY TO POLICE AND REBUILD THE RANGE. COORDINATE WITH RTAMS. PARAGRAPH 6003.2 HAS SPECIFIC REQUIREMENTS FOR NON-CAX UNITS USING THE RANGE.

SOP FOR RTAA

RANGE 410

Type: Platoon Fire and Maneuver Range

Location: Cleghorn Pass RTA, grid NT953958 to NT960959 to NT955974 to NT952974

Allowable Weapons:

- v M-16
- v M-249 SAW
- v M-60/M-240G Machine Gun
- v M-2 Machine Gun
- v M-203 grenade launcher
- v MK-19
- v SMAW
- v AT-4
- v Demolitions
- v Bangalore Torpedoes
- v Pyrotechnics
- v Practice Grenades

Allowable Munitions:

- v 5.56mm (all DODICs)
- v 7.62mm (all DODICs)
- v .50 cal (all DODICs)
- v M-203 - B504, B534, B-535, B536, B475, B477, B508, B509, B519
- v MK-19 - B480, B576
- v SMAW - HX04, HX05, HX07, AX11
- v AT-4 - C995
- v Demolitions
- v Bangalore Torpedoes
- v Pyrotechnics
- v Practice Hand Grenades - G811, G878

Direction of Fire: North (Axis of Advance - North)

Maximum Range: 1,500 meter

Left Lateral Limits: Grid NT955957

Right Lateral Limits: Grid NT959958

Range Facilities:

- v Two trench lines, approximately 60 meters in length
- v One squad position with silhouette targets
- v Three BMP tire targets
- v Wire obstacles
- v Simulated minefields
- v LZ-12

Special Targetry: N/A

SOP FOR RTAA

- Special Instructions:
1. LZ-12 is located at Range 410, grid NT952963. Clearance from BEARMAT on frequency 49.85 must be obtained prior to entry/exit of LZ-12.
 2. Demolitions and Bangalore Torpedoes should be kept to the minimum quantity and Net Explosive Weight (NEW) required to breach the minefields and wire entanglements.
 3. All discarded launch tubes (SMAW, etc.) shall be returned to the Combat Center Magazine.

NOTE: UNITS OTHER THAN CAX FORCES ARE REQUIRED TO REBUILD THE RANGE UPON COMPLETION OF TRAINING. UNITS SHOULD ALLOW AT LEAST ONE DAY TO POLICE AND REBUILD THE RANGE. COORDINATE WITH RTAMS.

SOP FOR RTAA

RANGE 410A

Type: Platoon Hasty Attack and Maneuver Range

Location: Cleghorn Pass RTA, grid NT965966 to NT9700970 to NT964980
to NT957976

Allowable Weapons:

- v M-16
- v M-249 SAW
- v M-60/M-240G Machine Gun
- v M-2 .50 cal. Machine Gun
- v M-203 grenade launcher
- v MK-19
- v SMAW
- v Bangalore Torpedo
- Demolitions
- M-67 Fragmentation Grenades (See Special Instructions)
- Practice grenades
- v Pyrotechnics

Allowable Munitions:

- v 5.56mm (all DODICs)
- v 7.62mm (all DODICs)
- v 50 cal. (all DODICs)
- v M-203 - B534, B504, B535, B536, B475, B477, B508, B509, B519
- v MK-19 - B480, B576
- v SMAW - HX04, HX07, AX11
- v Bangalore Torpedoes
- v Demolitions
- M-67 Fragmentation Grenades (See Special Instructions)
- v Practice Grenades - G811, G878
- v Pyrotechnics

Direction of Fire: Northwest (Axis of Advance - North)

Maximum Range: 1,000 meter

Left Lateral Limits: Grid NT962962

Right lateral Limits: Grid NT970962

Range Facilities:

- v Silhouette targets
- v Bunkers
- v Simulated minefield
- v Two obstacles containing simulated antipersonnel and antitank mines.

Special Targetry: Bunker complexes for trench clearing.

SOP FOR RTAA

- Special Instructions:
1. M-67 Fragmentation grenades will only be used under the direct supervision of the TTECG staff running the 400 series events during a scheduled Combined Arms Exercise.
 2. The quantity of demolitions and Bangalore torpedoes should be kept to the minimum NEW required to breach the minefields and wire obstacles.
 3. All discardable launch tubes (SMAW, etc.) shall be returned to the Combat Center Magazine.

NOTES: (1) ALL UNITS ARE REQUIRED TO REBUILD THE RANGE UPON COMPLETION OF TRAINING. UNITS SHOULD ALLOW AT LEAST ONE DAY TO POLICE AND REBUILD THE RANGE. COORDINATE WITH RTAMS.

(2) NON-CAX UNITS AND CAX UNITS THAT DO NOT USE FRAGMENTATION GRENADES CAN ESTIMATE COSTS AT APPROXIMATELY \$600. CAX UNITS THAT USE M-67 FRAGMENTATION GRENADES CAN ANTICIPATE REBUILD COST OF APPROXIMATELY \$1400.

SOP FOR RTAA

RANGE 500

Type: Armor Multi-Purpose Range Complex

Location: Cleghorn Pass RTA, grid NT984960 to NT994960 to PT007963 to NU986013 to NU972010 to NT988973 to NT985973

Allowable Weapons:

- v 105/120 Tank Main Gun
- v TOW
- v M-47 DRAGON
- v MK-153 SMAW
- v MK-19 40mm Machine Gun
- v M-203 grenade launcher
- v LAV 25mm Chain Gun
- v 50 cal Machine Gun
- v M-60/M-240G Machine Gun
- v M-249 SAW
- v M-16A1/A2
- v 60mm Mortar
- v 81mm Mortar

Allowable Munitions:

- v Small Arms (5.56mm, 7.62mm, .50 cal)(all DODICs)
- v M-203 - B534, B504, B535, B536, B475, B477, B508, B509, B519
- v Tank Main Gun (105) - C510, C503, C511, C520
- v Tank Main Gun (120)- C784, C785
- v TOW - PB-95, PB-96, PB-99 (Inert only)
- v DRAGON - PL22 (inert only)
- v SMAW - HX04, HX07, HX11 (inert only)
- v MK-19 - B480, B576
- v 25mm - M791, M793, M910
- v 60mm Mortar - B627, B647 (Illumination only)
- v 81mm Mortar - C226, C871 (Illumination only)
- v Pyrotechnics

Maximum Range: 6,500 meters

Direction of Fire: North/Northwest; 020 - 060 mag

Left Lateral Limits: 350 grid, 004 mag, 6195 mils

Right Lateral Limits: 120 grid, 134 mag, 2124 mils

Range Facilities:

- v Bivouac Area/Casebans
- v Ammunition Loading Dock/Breakdown Building
- v Admin/Maintenance Building
- v Range Control Building
- v Head

Special Targetry:

- v Fifteen stationary armor targets
- v Three moving targets
- v Twenty stationary personnel targets

SOP FOR RTAA

- v Ten moving personnel targets
- v Seventeen armor target kill simulators
- v Forty-five armor hostile fire simulators

Special Instructions:

1. Road guards
 - a. Posted prior to the commencement of live fire.
 - b. RSO must have positive two-way communications with road guards at all times.
 - c. Posted at range markers at the following locations:
 - (1) NT987961,
 - (2) NU916094,
 - (3) NU985090.
2. Prior to commencing live fire, the Company Commander/ Master Gunner/RSO will tour the authorized lanes with a Range Safety Inspector. Discrepancies or damage to the range will be noted. Prior to departing the range at the completion of live fire, the Company Commander/ Master Gunner/RSO shall tour the lanes again with a Range Safety Inspector.
3. The DESERT TORTOISE has the right-of-way. Any unit encountering a desert tortoise shall strictly adhere to the requirements in paragraph 10006. Injured or dead tortoises shall be reported immediately to the NREA Division via BEARMAT.
4. No vehicular travel off established MSRs.
5. Due to buried cable and environmental restrictions, tactical vehicles utilizing the MPRC must remain in marked lanes. If a vehicle violates range markers or boundaries, contractors will stop range operations and BEARMAT will direct an immediate cease fire. Operation will not recommence until a Range Safety Inspector has inspected the damage.
6. Range violations will not be tolerated. Units repeatedly straying off established MSRs will be expelled from the range. The unit will not be rescheduled on the MPRC without the permission of the Dir, O & T.
7. Bivouac sites are located at NT985965.
8. Using units must police up all TOW/Dragon wires.

SOP FOR RTAA

9. Units are responsible for replacement of fuel for the generators used to operate Range 500 (fuel usage is approximately eight gallons of diesel per hour).
10. Units are responsible for replacement of water used in head facilities.
11. SABOT petals must be recovered and turned into the Range Residue Processing Center.

NOTE: THE STANDARD MAINTENANCE CYCLE IS SIX DAYS OF FIRING FOLLOWED BY ONE DAY OF MAINTENANCE. DUE TO CONTRACTED MAINTENANCE, THIS CYCLE WILL NOT BE BROKEN WITHOUT THE PERMISSION FROM THE DIR, O & T.

SOP FOR RTAA

RANGE 601

Type: Sensitive Fused Munitions Range

Location: Rainbow Canyon RTA, from grid NU7019 to NU7022 to NU7322 NU7319 and back to NU7019. Target location: NU711205; longitude 116 13' 31" latitude 34 31' 31"

Allowable Weapons: v Air delivered:
v MK20
v CBU-58
v CBU-63
v CBU-75
v CBU-77
v CBU-87
v 2.75 inch rocket
v Artillery

Allowable Munitions: v Air: C462, C469, 2.75" Rocket (H-463, H-464)
v Artillery: D561, D562, D563, D651, and D684

Direction of Fire: Mandatory identification run-in on 210 degrees magnetic. After positive identification run-in between 150 degrees and 270 degrees authorized Left or right hand pull off target authorized.

Left Lateral Limits: N/A

Right Lateral Limits: N/A

Range Facilities: N/A

Special Targetry: v Target is CENTER grid with plateau as backstop.
v Target backstop elevation is 3,583 feet MSL.

Special Instructions: 1. The firing of all weapons will be done per the contents of this Manual.

2. Controlling Agency is BEARMAT on 323.5/49.85.

3. Range 601 is a No Maneuver Area. No personnel or vehicles are allowed to enter or maneuver through Range 601 at any time.

4. Pilot must make first pass over target simulated and confirm positive ID with BEARMAT prior to re-attack.

5. Any ordnance that fails to impact within the center grid will be reported after run/mission to MCAGCC EOD via BEARMAT.

SOP FOR RTAA

6. FACs/FOs will be utilized for ordnance delivery/firing into Range 601.
7. Any ordnance that fails to impact within the confines of the buffer zone will be reported immediately to MCAGCC EOD via BEARMAT and further firing/delivery of ordnance will cease until impact site is cleared by MCAGCC EOD and approval is granted to continue firing/delivery by Dir, O & T.
8. Artillery units will utilize the southern part of the Rainbow Canyon RTA for firing positions ONLY.
9. Use of Dual Purpose Improved Conventional Munitions (DPICM) is limited to Range 601 and requires a waiver per paragraph 3017.

SOP FOR RTAA

RANGE 603

Type: Weapons Impact Scoring System (WISS) Range

Location: Bullion RTA, from grid PU053041 to PU071041 to PU071062 to PU053062

Allowable Weapons: Air delivered practice/inert ordnance

Allowable Munitions: v 2.75 inch inert rockets
v Practice Bombs - E973, E962, W/F562, F534

Direction of Fire: Run-in headings are 170 and 350 degrees unless otherwise specified by Bearmat

Maximum Range: N/A

Range Facilities: Two (2) buildings containing range equipment (PU078061, PU06930417).

Special Targetry: Circle with M-60 tank hulk (PU06930417).

Special Instructions: 1. The WISS is a contractor controlled range. Units should schedule this range a minimum of five working days in advance.

2. Upon contact with BEARMAT when entering R-2501 the aircraft will indicate intention to use the WISS.

3. A target identification pass is required.

4. The pilot will be directed to switch to 321.8 for control during bombing practice.

5. Upon completion of WISS use the pilot will be directed to switch back to BEARMAT on 323.5 for further clearance.

SOP FOR RTAA

RANGE 605

Type: Door Gunner Range

Location: Bullion RTA , vicinity grid PU045055

Allowable Weapons: v M-60/M-240G Machine Gun
v M-2 Machine Gun
v 20mm Cannon
v 30mm Cannon
v 2.75 inch rockets

Allowable Munitions: v 7.62mm (all DODICs)
v .50 Cal (all DODICs)
v 20mm (all DODICs)
v 30mm - B118, B119, B120
v 2.75 inch Rockets (H161, H163, H519, H534, H836, H837, H838, H847, H848, H850, H892, H893)

Direction of Fire: N/A

Maximum Range: N/A

Range Facilities: N/A

Special Targetry: N/A

Special Instructions: 1. Aircraft are required to make a cold, low-level ID pass to ensure Range 605 target area is clear of all personnel.

2. Contact BEARMAT 323.5 UHF, 49.85 VHF prior to commencing live fire.

3. Maximum engagement altitude for all weapons will not exceed 2,000 feet AGL.

SOP FOR RTAA

RANGE 607

Type: Strafe Range

Location: Bullion RTA, from grid PU062025 to PU074025 to PU062000 to PU074000

Allowable Weapons: v 20mm Cannon
v 30mm Cannon

Allowable Munitions: v Inert ammo only

Direction of Fire: Run-in heading South to North

Maximum Range: 2500 meters

Range Facilities: One (1) microwave dish transmitter, four (4) sensors, and one sensor transmitter (PU06870095, PU06930094, PU07020098, PU07090095)

Special Targetry: Four (4) tire stacks located along the base of the hill mass

Special Instructions: 1. The Strafe range is a contractor controlled range. Units should schedule this range a minimum of five working days in advance.

2. Upon entering the R-2501 the pilot will notify BEARMAT of their intention to use the range.

3. A target identification pass is required by all aircraft using this range.

4. BEARMAT will direct the aircraft to switch to frequency 321.8 for control during strafing runs. Upon completion of training the aircraft will switch back to 323.5 for further clearance from BEARMAT.

SOP FOR RTAA

APPENDIX C

COMBAT CENTER AIRSPACE COMPLEX

The Combat Center Airspace Complex consists of the Restricted Airspace R-2501, Bristol MOA/Air Traffic Controller Assigned Airspace (ATCAA), and Sundance MOA. These are represented in Figure C-1.

1. R-2501. Marine Corps Air Ground Combat Center, Twentynine Palms, California.

a. Outside Boundary of R-2501.

LATITUDE	LONGITUDE	MGRS	
34 29 59 N	116 26 27 W	NU 513 177	to
34 35 59 N	116 28 07 W	NU 487 288	to
34 40 29 N	116 29 48 W	NU 461 371	to
34 42 58 N	116 26 26 W	NU 512 417	to
34 43 01 N	116 17 08 W	NU 654 419	to
34 43 01 N	116 04 34 W	NU 846 388	to
34 40 59 N	116 03 08 W	NU 868 383	to
34 35 32 N	115 58 05 W	NU 946 283	to
34 34 38 N	115 55 02 W	NU 993 267	to
34 29 59 N	115 47 04 W	PU 115 238	to
34 24 59 N	115 47 07 W	PU 116 090	to
34 25 00 N	115 44 07 W	PU 162 091	to
34 14 01 N	115 44 05 W	PT 165 888	to
34 13 59 N	115 57 07 W	NT 965 885	to
34 14 01 N	116 17 04 W	NT 658 883	to
34 19 30 N	116 20 32 W	NT 605 984	to
34 29 59 N	116 26 27 W	NU 513 177	done

NOTE: UTM GRID COORDINATES ARE NIMA MAPS, SERIAL NUMBERS V795S29PALMEMIM AND V795S29PALMWMIM. ALL COORDINATES ARE IN NAD 83/WGS 84.

b. Type Exercise and Ordnance. Unlimited except:

(1) No MK20 (ROCKEYE, etc.) may be delivered except in the designated area of R-2501 North (Appendix B, Range 601).

(2) Supersonic flight is authorized only when expressly approved by the Director, Operations and Training.

c. Floor. Surface.

d. Ceiling. Unlimited.

e. Usage Limitations. Available 24 hours per day.

SOP FOR RTAA

f. Communications. Flight leaders shall check in with BEARMAT on 323.5 UHF, or 49.85 VHF/FM before entry into or departure from R-2501, and pass call sign of each aircraft, MODE 3 squawk, current altitude, number/type of ordnance, type ordnance delivery, and scheduled time on target. Upon departure, pass location, and number of known or suspected duds to BEARMAT.

g. Scheduling

(1) Authority. CG, MCAGCC (IAW Chapter 2)

(2) Lead Time. For best results in avoiding scheduling conflicts, a lead time of 30 to 90 days is recommended. Requests must be received by Range Scheduling a minimum of five working days in advance of intended use of RTAA.

(3) Overlapping and Adjacent Areas. Other training units may be scheduled concurrently under, over or adjacent to the requested area with one thousand feet of vertical separation between users. Indirect fire weapons may schedule airspace up to 40,000 feet MSL. Direct fire weapons may schedule airspace up to 5,000 feet MSL. Concurrent scheduling of adjacent areas can be expected. Units desiring airspace above 26,000 feet MSL must make special coordination with Range Scheduling and through Range Control, Bearmat.

h. Remarks/Special Instructions. R-2501 Airspace not scheduled for military training is released to the FAA on a daily basis, particularly 26,000 feet MSL and above. In particular, airspace above 26,000 feet MSL is unavailable daily from 0930-1230 and 1730-2030. Using units should ensure that all airspace desired for overflight or ordnance delivery is requested with as much lead time as possible.

(1) If the scheduled activity is canceled, Range Scheduling shall be notified so that the airspace may be scheduled by other users. DSN for Range Scheduling is 957-6313, FAX number 957-6929.

(2) Training area and airspace maps may be requested from Defense supply center (paragraph 1004).

(3) R-2501 North, East, South and West may be requested concurrently or individually by any user. Approval is subject to prior scheduling.

I. R-2501 is divided into four lesser areas of airspace (Figure C-1 for schematic diagram). The following is a description of locations and boundaries and any peculiarities of each of the subdivisions of airspace.

(1) R-2501 North.

Beginning at:

LATITUDE	LONGITUDE	MGRS	
34 29 59 N	116 26 27 W	NU 513 177	to
34 35 59 N	116 28 07 W	NU 487 288	to
34 40 29 N	116 29 48 W	NU 461 371	to
34 42 58 N	116 26 26 W	NU 512 417	to
34 43 01 N	116 17 08 W	NU 654 419	to
34 41 16 N	116 04 34 W	NU 846 388	to
34 40 59 N	116 03 08 W	NU 868 383	to

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LATITUDE	LONGITUDE	MGRS	
34 35 36 N	115 58 05 W	NU 946 283	to
34 34 38 N	115 55 02 W	NU 993 267	to
34 33 57 N	115 58 27 W	NU 946 254	to
34 29 41 N	115 58 18 W	NU 944 174	to
34 27 31 N	116 04 20 W	NU 852 134	to
34 28 13 N	116 12 25 W	NU 728 146	to
34 31 59 N	116 17 37 W	NU 648 215	to
34 29 59 N	116 26 27 W	NU 513 177	done

Critical Fuse Impact Area. MK-20 (ROCKEYE, etc.) may impact only in Range 601. Specific authorization from Range Scheduling is mandatory. Refer to Appendix B, Range 601, for specific instructions. The impact area is described as: TNP R-303, 30 dmf; Grid Coordinate NU711205; Latitude N 34 31' 31" and Longitude W 116 13'34".

(2) R-2501 East.

LATITUDE	LONGITUDE	MGRS	
34 34 41 N	115 55 09 W	NU 991 268	to
34 32 59 N	115 47 04 W	PU 115 238	to
34 24 59 N	115 47 03 W	PU 117 090	to
34 25 00 N	115 47 07 W	PU 162 091	to
34 14 01 N	115 44 05 W	PT 165 888	to
34 13 59 N	115 57 07 W	NT 965 885	to
34 20 10 N	115 59 08 W	NT 933 999	to
34 27 31 N	116 04 20 W	NU 852 134	to
34 29 41 N	115 56 18 W	NU 944 175	to
34 34 01 N	115 58 07 W	NU 946 255	to
34 34 41 N	115 55 09 W	NU 991 268	done

Special Instructions/Limitations. No MK20 ordnance. No ordnance delivery will be allowed in grid squares NU9709, NU9809, and NU9909 located in the Lava RTA. This is the petroglyph site and has significant historical interest.

(3) R-2501 South.

LATITUDE	LONGITUDE	MGRS	
34 28 10 N	116 12 29 W	NU 727 145	to
34 27 31 N	116 04 20 W	NU 852 134	to
34 20 10 N	115 59 08 W	NT 933 999	to
34 13 59 N	115 57 07 W	NT 965 885	to
34 14 01 N	116 17 07 W	NT 658 883	to
34 19 30 N	116 20 32 W	NT 605 984	to
34 19 29 N	116 15 54 W	NT 676 984	to
34 24 54 N	116 17 56 W	NU 644 084	to
34 28 10 N	116 12 29 W	NU 727 145	done

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Special Instructions/Limitations. No MK 20 ordnance. The Combat Center Rifle Range and Pistol Range should be considered live 0-3000 feet AGL during daylight hours.

Non-impact Areas. The following RTAs are designated as non-impact areas: West, Sand Hill, Mainside, Acorn and East, and south of the 05 grid line (for air delivered ordnance) in Emerson Lake.

(4) R-2501 West.

LATITUDE	LONGITUDE	MGRS	
34 29 59 N	116 26 27 W	NU 513 177	to
34 31 59 N	116 17 41 W	NU 647 215	TO
34 28 13 N	116 12 25 W	NU 728 146	to
34 24 54 N	116 17 56 W	NU 644 084	to
34 19 29 N	116 15 54 W	NT 676 984	to
34 19 30 N	116 20 32 W	NT 605 984	to
34 29 59 N	116 26 27 W	NU 513 177	done

Special Instructions/Limitations. No MK-20 ordnance. Aviation delivered ordnance may not be utilized in the area except by express permission of the Dir, O & T.

2. BRISTOL MOA/ATCAA

a. Outside Boundary.

LATITUDE	LONGITUDE	
34 43 00 N	116 17 06 W	to
34 42 50 N	115 26 36 W	to
34 22 00 N	115 35 26 W	to
34 17 00 N	115 41 16 W	to
34 25 00 N	115 44 06 W	to
34 33 00 N	115 47 06 W	to
34 34 40 N	115 55 01 W	to
34 35 30 N	115 58 06 W	to
34 41 00 N	116 03 06 W	to
34 41 15 N	116 04 36 W	to
34 43 00 n	116 17 06 w	done

b. Altitude. 5,000 MSL (Daggett Altimeter) to but not including Flight Level 180. ATCAA is available from Flight Level 180 to Flight Level 220.

c. Ordnance. No ordnance may be employed within or fired from the Bristol MOA/ATCAA.

d. Type Exercise. Unlimited except for supersonic flight.

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e. Communications. Operations within the Bristol MOA/ATCAA shall be conducted on an ATC clearance. Pilots shall obtain an ATC clearance from Los Angeles Center prior to entering or departing the Bristol MOA/ATCAA. Contact BEARMAT on 323.5 or 49.85 once within and prior to departure of the Bristol MOA/ATCAA. Radar flight following may be available from BEARMAT at altitudes of 6,000 feet AGL and above.

f. Special Instructions. Pilots operating in the Bristol MOA/ATCAA shall be responsible for remaining within the vertical and lateral confines of the MOA/ATCAA as specified in the ATC clearance. Pilots are responsible for ensuring separation from other military aircraft (MARSA) and from VFR aircraft that may transit the MOA.

3. SUNDANCE MOA.

a. Outside Boundary

LATITUDE	LONGITUDE	
34 14 00 N	116 06 06 W	to
34 14 00 N	115 44 06 W	to
34 11 00 N	115 47 36 W	to
34 11 00 N	116 06 06 W	to
34 14 00 N	116 06 06 W	done

b. Altitude. 500 AGL - 10,000 MSL (Palm Springs Altimeter) excluding a 1 mile radius of the SELF surface to 1500 feet AGL and a 1 mile wide corridor extending from the center of the SELF on a straight line south to the edge of the MOA.

c. Ordnance. Ordnance may not be employed within or fired from the Sundance MOA.

d. Type Exercise. Operations within the Sundance MOA shall be limited to those "SPECIAL OPERATIONS" required in conjunction with R-2501. These "SPECIAL OPERATIONS" include the CAX, 7th Marine Regiment exercises, and those exercises, which require the use of the entire R-2501. Requests for other usage of the Sundance MOA must be submitted to Range Scheduling for approval 60 days prior to the desired dates.

e. Clearance. An ATC clearance need not be obtained from Los Angeles Center for operations conducted within Sundance MOA. Authorization for flight into Sundance MOA shall be obtained from BEARMAT on 323.5 or 49.85.

f. Special Instructions. Pilots operating in the Sundance MOA shall be responsible for ensuring separation from IFR aircraft arriving/departing the SELF located within the RTAA (R-2501).

g. Scheduling Authority. CG, MCAGCC (IAW Chapter 2)

NOT TO SCALE

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APPENDIX D

LANDING ZONES

1. GENERAL. The following LZs are those most frequently used but does not constitute all LZs at the Combat Center. Units may select zones within the RTAA, at their discretion, to meet tactical situations.

LZ #	COMMON NAME	LOCATION	COMMENTS
1	CG's Parade Deck (VIP)	NT869886	Grass area adjacent to headquarters building, VIP Code 6 and above only
2	TTECG Crampton	NU844031	North side OP Crampton
3	OP Crampton	NU846026	Center zone vicinity storage tanks
4	EW Crampton	NU848025	Vicinity south bunker
5	OP Creole	NU637096	UH-1 only
6	Lower Creole	NU638094	Vicinity bunkers
7	Ripper	NT878885	200 SE LZ-10 Mainside
8	OP Round	NU651214	Vicinity Bunker
9	Camp Wilson	NT786952	Vicinity ESB
10	MEDEVAC Pad	NT874886	MEDEVAC PARKING ONLY
11	Range 400	NT932962	Lower left section of range 400
11A	Range 400	NT940969	Center of range 400
12	Range 410	NT952963	At lower left section of range 410
13	OP Cross	NU782099	Vicinity bunker
14	BEARMAT LZ	NT875902	Pad adjacent to radar site
15	Range 500 (MPRC)	NT986966	Near Range Control tower
16	Naval Hospital	NT878873	East of Naval Hospital
17	Gunfighter	NT784941	LZ-s 17 and 18 are co-located at the SELF under control of MWSS-374
18	Red		

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NOTE: (1) HELICOPTERS BOUND FOR LZ-1(CG's PARADE DECK) WILL LAND AND SHUTDOWN IN THE NORTHEASTERN CORNER OF THE PARADE DECK. NO AIRCRAFT WILL LAND AT LZ-1 WITHOUT SPECIFIC CLEARANCE FROM BEARMAT.

(2) ONLY VIP (CODE 6 OR HIGHER) HELICOPTER FLIGHTS ARE AUTHORIZED TO USE LZ-1. THE MOVEMENT OF PERSONNEL, EQUIPMENT, AND CARGO WILL BE ACCOMPLISHED BY USING LZ-7 OR OTHER LZs LOCATED OUT OF THE MAINSIDE COMPLEX.

(3) BEARMAT WILL RETAIN CONTROL OF ALL AIRSPACE WITHIN R-2501 (EXCLUDING THE SELF CDSA) AND WILL COORDINATE ALL TAKEOFFS AND LANDING FROM LZ-1, LZ-7, LZ-10, AND LZ-16.

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APPENDIX E

FIXED WING AND ROTARY WING CONTROL POINTS

1. The Commanding General, MCAGCC, has established the following fixed wing and rotary wing control points. These points were established as a safety factor to reduce confusion between the numerous different exercises that are conducted aboard MCAGCC every year.

2. Fixed Wing Control Points

POINT	LATITUDE	LONGITUDE	UTM GRID	GEOGRAPHIC REFERENCE	ELEVATION (FT)
ALPHA	N 34 41 30	W 115 57 00	NU 960393	HILL	2,616
AMBOY	N 34 32 40	W 115 47 28	PU 109232	CRATER	994
BUICK	N 34 31 59	W 116 17 33	NU 649215	OP ROUND	4,699
CAMARO	N 34 22 55	W 115 59 20	NU 930050	HILL	2,887
CHARLIE	N 34 26 25	W 115 35 50	PU 286118	E tip dry lake	600
CHEVY	N 34 21 10	W 116 02 58	NU 874017	BM-30*	2,816
CUTLASS	N 34 16 25	W 115 47 00	PT 120931	HILL	3,248
DODGE	N 34 20 12	W 116 19 37	NT 619997	BM-2*	2,794
EL CAMINO	N 34 22 40	W 115 45 35	PU 139046	HILL	3,248
FORD	N 34 35 39	W 116 25 42	NU 524282	ARGOS MTN	4,488
LAVIC	N 34 40 37	W 116 21 13	NU 592374	LAVA POINT	1,890
LOTUS	N 34 26 00	W 116 23 00	NU 564105	DRY LAKE	2,232
MAZDA	N 34 17 49	W 116 09 47	NT 770954	SELF (EAF)	2,055
MUSTANG	N 34 30 02	W 116 15 40	NU 679327	HILL	3,097
NASH	N 34 29 20	W 116 08 34	NU 787167	NOBLE "T"	3,000
OLDS	N 34 33 19	W 116 05 34	NU 832241	BM-17*	1,763
PLYMOUTH	N 34 35 30	W 115 55 48	NU 982282	HILL	1,068
PONTIAC	N 34 18 10	W 115 44 25	PT 160964	HILL	2,616
RANGER	N 34 32 30	W 116 00 20	NU 915168	HILL	2,884
SATURN	N 34 21 00	W 116 09 00	NU 781102	OP CROSS	3,835
SHELBY	N 34 32 47	W 116 00 09	NU 915232	BM-18*	1,160
VETTE	N 34 22 18	W 115 52 54	PU 038004	HILLTOP	4,046

*BM - Bench Mark

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3. Rotary Wing Control Points

POINT	LATITUDE	LONGITUDE	UTM GRID	GEOGRAPHIC REFERENCE	ELEVATION (FT)
ALBANY	N 34 21 08	W 115 03 58	NU 859016	FINGER	2,440
ATHENS	N 34 16 28	W 116 02 41	NH 880928	HILL	2,605
ATLANTA	N 34 32 07	W 116 12 03	NU 733218	FINGER	3,140
AUGUSTA	N 34 28 21	W 116 08 14	NU 792149	HILL	3,443
BRONX	N 34 29 09	W 115 59 28	NU 926165	HILL	2,360
BROOKLYN	N 34 24 39	W 115 59 00	NU 935082	BM-26*	2,881
CARLSBAD	N 34 29 52	W 116 24 57	NJ 537173	HILL	3,000
COLUMBUS	N 34 24 44	W 116 03 23	NU 866083	FINGER	2,440
DALLAS	N 34 23 07	W 116 10 58	NU 751052	BM-8*	2,461
DEL MAR	N 34 33 39	W 116 25 54	NU 521245	HILL	3,200
EL PASO	N 34 31 59	W 116 17 33	NU 649215	OP ROUND	4,699
HOUSTON	N 34 35 29	W 116 22 53	NU 567279	DRAW	2,680
JACKSONVILLE	N 34 26 14	W 115 52 51	PU 028112	FINGER	1,200
LOS ANGELES	N 34 27 12	W 116 21 46	NU 585126	DRY LAKE	2,300
MACON	N 34 32 34	W 116 08 23	NU 789227	HILL	2,617
MIAMI	N 34 18 38	W 115 56 16	NT 977971	BM-28*	2,320
PASADENA	N 34 40 32	W 116 24 33	NU 541372	FINGER	3,105
PENSACOLA	N 34 33 06	W 116 00 24	NU 915232	HILL	1,160
SAN ANTONIO	N 34 27 37	W 116 11 42	NJ 740133	HILL	3,120
SAN DIEGO	N 34 23 29	W 116 17 06	NU 657058	HILL	3,037
SAVANNAH	N 34 38 05	W 116 15 40	NU 677328	HILL	3,097
TALLAHASSEE	N 34 29 20	W 115 55 45	NU 983170	HILL	1,400
TAMPA	N 34 21 23	W 115 50 26	PU 066023	HILL	2,245
QUEENS	N 34 28 33	W 115 59 16	NT 931969	FINGER	2,840
WASHINGTON	N 34 15 26	W 116 03 29	NT 867911	HILL	2,617

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APPENDIX F

AMMUNITION CONTROL

1. Responsibilities. The OIC of the firing site has the overall responsibility for the control, handling and accountability of ammunition and explosives at this range. Control of ammunition is accomplished by proper supervision at all times. Stringent security, accountability, and control must be prescribed to ensure that every round of ammunition which is authorized, requisitioned, on-hand for security purposes or maintained in the field in conjunction with an exercise is accounted for. Ammunition not expended upon termination of the exercise will be returned to the appropriate storage activity.

a. Ammunition Control. The following ammunition control procedures should be utilized. All Class V drawn will be delivered to the OIC of the firing site. The OIC is responsible to ensure that the Class V items are inventoried against copies of the issue document (DD Form 1348-1) and will receipt for the items by DODIC, Lot Number and Quantity. The OIC will either sign for the items on copies of the requisitions document or sign a locally produced "Receipt of Class V" form. The above inventory should not be delegated solely to the unit ammo tech but should be conducted in conjunction with range supervisory personnel. The OIC will:

(1) Ensure that the Class V is controlled and issued to user by lot numbers.

(2) Ensure that ammunition is not prematurely removed from the original packaging per MCO 8020.10.

(3) Ensure that all supervisory personnel are familiar with MCO 8025.1C and have in their possession a NAVMC 10155 Card (Ammunition Malfunction/Data Collection Guide).

(4) Upon completion of the field exercise, the OIC shall ensure that all unexpended Class V is inventoried, verified, and receipted for by an appropriate storage activity. Again, the inventory should not be the sole responsibility of the unit ammo tech. The inventory should be conducted in conjunction with range supervisory personnel. The OIC will sign the Turn-in Document (DD Form 1348-1) for the types, lots and quantities of material inventoried. Once signed, there should be no changes in the quantity filed. If additional ammunition is subsequently turned in, a new DD Form 1348-1 will be made for the quantity. No pen changes will be allowed on the DD Form 1348-1 as this may indicate a compromise in ammunition control.

(5) If any Class V items are determined missing due to the above inventory, the using unit will submit a Missing, Lost, Stolen, or Recovered Report (M-L-S-R) per MCO 4340.1.

2. Safety and Handling. Safety is of the utmost importance in the use and handling of ammunition and explosives and is the responsibility of each individual concerned. The primary responsibility is to prevent any conditions which may cause injury or

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death. All personnel involved in the use of ammunition and explosives will be thoroughly indoctrinated in safety precautions, procedures, and principles.

a. There are three major principles involving safety, which will prevent accidents, caused by the human element.

(1) Proper supervision by qualified personnel.

(2) Proper training and instruction of individuals, crews, or other personnel who handle, transport, use, or fire ammunition or explosives.

(3) Proper and effective security.

b. Ammunition is designed to inflict casualties and destroy property and material. It makes no distinction between friend or foe. Negligence and/or improper handling can cause it to function before its intended use. Ground safety precautions to be observed during exercises include but are not limited to the following:

(1) Unit commanders shall establish procedures, which ensure recovery of all ordnance and salvageable ammunition components (brass, links, etc.), prior to departing from the firing site.

(2) Ammunition requested and maintained in the field shall be limited to that quantity necessary to support known requirements. The quantity must not exceed that which can be properly safeguarded.

(3) Unserviceable ammunition shall be provided the same degree of security that is afforded other categories of ammunition.

(4) Ammunition shall not be removed from any military activity, except as duly authorized by proper authority.

(5) Ammunition shall not be provided gratuitously, offered for sale, sold, exchanged, or bartered for privately owned or government property.

(6) Ammunition shall never be abandoned, destroyed, fired indiscriminately, or otherwise disposed of in order to circumvent the inconvenience of returning it to a storage site (Art. 99 of the UCMJ).

(7) Ammunition shall not be disassembled, altered, or modified, except for those normal operations provided for in user-level technical publications (i.e., fusing projectiles), and authorized operations performed by qualified EOD personnel.

(8) Commanders will ensure that required personnel have a thorough knowledge of withdrawal and turn-in procedures.

(9) Ammunition shall be expended for intended training purposes only.

(10) Commanders will ensure that proper training and instruction is carried out for individual crews or other groups who will handle, fire, or otherwise expend ammunition.

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(11) Manufacture of improvised bombs, grenades, shells, explosives charges, or saluting charges is prohibited.

(12) Ammunition or explosives will not be modified or deactivated, nor will any attempt be made to fix, repair, or reshape ammunition in any form.

(13) The use of live ammunition for drill purposes is prohibited.

(14) Burying or hiding Class V for future use or other purposes is prohibited.

(15) Touching or moving UXO or similar ordnance items except by EOD personnel is prohibited.

(16) All ammunition should be considered hazardous and handled accordingly. Personnel detailed to handle Class V will be instructed and closely supervised on the safety requirements and hazards involved.

4. Ammunition Checklist. The following ammunition checklist is provided to assist the OIC in the following; ammunition control, accountability, safety, and reporting. This checklist, although not a complete listing of all facets of ammunition, provides the OIC with basic guidance for the conduct of ammunition related matters at the firing site.

AMMUNITION CHECKLIST

1. Upon Delivery of Class V to Firing Site

_____ Have range supervisory personnel, in conjunction with the unit ammo tech, completed a physical inventory of all items matching quantities inventoried against quantities on the DD Form 1348-1 Requisition Document?

_____ Has the OIC or his appointed representative signed/receipted for the ammunition and explosives?

_____ Has the number of individuals making the issue to the troops been kept to the minimum number necessary to make the issue to enhance control and accountability?

_____ Are issues being made with respect to lot integrity (i.e., if a malfunction occurs of a specific lot) that lot can easily be identified and collected from individuals?

_____ Is ammunition being prematurely removed from packing prior to actual need?

_____ Is packaging being saved for turn-in?

_____ Has security been established on the ammunition?

_____ Has ammunition been provided proper protection from the elements?

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2. During Exercise

_____ Do supervisory personnel have in their possession a NAVMC 10155 Card (Ammunition Malfunction Data Collection Guide) in the event of a malfunction?

_____ Do supervisory personnel know what to do in the event of a malfunction (i.e., cease firing, render assistance to casualties, identify all witnesses to the malfunction and safeguard weapon material and fragments which could provide evidence as to the cause of the malfunction) (CCO P8000.4, Chapter 5 applies)?

3. After Completion of Exercise

_____ Has all unexpended ammunition been collected and repackaged by matching lot numbers of ammunition to packaging?

_____ Have supervisory personnel, in conjunction with the unit ammo tech, conduct a physical inventory of unexpended ammunition and completed a Turn-in Document (DD Form 1348-1)?

_____ Has the OIC signed the Turn-In Document (DD Form 1348-1) verifying the types and quantities of ammunition to be turned in is correct?

_____ Has a Malfunction/Deficiency Report been initiated per MCO 8025.1C, if there was a malfunction?

_____ Has an M-L-S-R Report been submitted on items determined missing during the physical inventory per MCO 4340.1?

_____ Has an ammunition expenditure report been submitted to the appropriate command(s)?

_____ Have all empty ammunition, explosive and dangerous article containers been subjected to a 100 percent inspection prior to shipment to other activities for storage, reuse, or salvage per NAVSEA OP 5 Volume 1?

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APPENDIX G

LASER OPERATIONS

Ref: (a) ANSI Z136.1 - 1986 (NOTAL)
(b) SPAWARINST 5100.12B
(c) OPNAVINST 5100.23
(d) SECNAVINST 5100.14B
(e) NAVMEDCOMINST 6470.2
(f) MCO5104.1
(g) MCO 3570.1A

1. General. Range Control procedures concerning laser use at MCAGCC are designed to prevent exposure to hazardous levels of laser radiation. The regulations and guidelines listed in this Appendix are to be utilized in conjunction with individual unit SOP and existing Naval Regulations contained in references (a) through (g).

2. Background. The word laser is an acronym derived from a description of the physical process: Light Amplification by Stimulated Emission of Radiation (LASER). The laser generates a collimated beam of intense, monochromatic light that is usually invisible under normal operating conditions. The basic hazard associated with laser light is eye damage. This damage can vary from a small burn, undetectable by the injured person, to severe impairment. Eye damage by laser light occurs three ways:

- a. Intrabeam or direct viewing.
- b. Diffuse reflection.
- c. Specular reflection.

Direct viewing is the most hazardous form as the light beam is focused directly on the retina. Diffuse reflections occur when the laser beam intercepts a rough surface and is reflected in a scattered pattern. Specular (mirror-like) reflections redirect the light beam and cause the same eye damage as direct viewing. The use of appropriate eye wear (goggles or visors) with the correct optical density (OD) for the frequency of the laser will eliminate the ocular hazards associated with lasers.

3. Definitions of Terms

a. Diffuse Reflection. The scattering of laser light as it reflects off of a rough surface.

b. Divergence. The increase in the diameter of the laser beam with distance from the aperture of the laser.

c. Maximum Permissible Exposure (MPE). The level of radiation to which a person may be exposed without hazardous effect.

d. Nominal Ocular Hazard Distance (NOHD). The distance from the laser to the human eye beyond which laser exposure does not pose a hazard.

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e. Optical Density (OD). Refers to the density of the eye wear (goggles or visors) required to protect the eye from laser radiation.

f. Specular Hazard. A shiny or mirror-like surface. Examples are vehicle windows, polished metals, standing water, plexiglas, and chrome bumpers,

4. Laser Safety Program. Prior to conducting any laser operations, training units must establish laser safety programs, which include at a minimum the following elements:

- a. Laser Safety Regulations as defined in reference (b).
- b. Laser Safety Training Program as defined in references (a) and (b).
- c. Laser Protective Goggles and Equipment Program as defined in reference (b).
- d. Medical Surveillance Program as defined in reference (b).

5. SOP for LASER use on Ranges

- a. The following general rules apply to all laser range operations:

(1) All units conducting laser operations must have a Laser Range Safety Officer (LRSO). This individual is normally the mission commander or laser operator supervisor certified to conduct laser operations on authorized ranges upon satisfactory completion of a formal LRSO course. The LRSO is responsible for ensuring all range regulations contained herein and other applicable Navy Regulations are adhered to and enforced. A copy of the LRSO or LSSM appointment letter must be forwarded to the MCAGCC LSSO prior to that unit's use of MCAGCC's laser ranges.

(2) The LRSO must receive a Laser Range Safety Brief by the Range Safety Office prior to conducting laser operations.

(3) When scheduling a laser range, the training area must be scheduled and approved through Range Scheduling.

(4) Prior to conducting laser operations at the scheduled range(s), the unit will conduct a thorough air or ground inspection to ensure no specular hazards exist.

(5) Range boundaries must be visible to all personnel involved in laser operations.

(6) Cease lasing immediately if unidentified personnel/aircraft enter the laser range.

(7) Any personnel within the target area or danger area along the laser-target line must wear appropriate eye protection when laser firing is in progress (Table G-1 for required optical density of eye wear).

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(8) When lasing, the laser must always be pointed down range or towards the target/impact area.

(9) Aircraft must never be lazed.

(10) Lasers shall not be activated until the target has been positively identified by the operator.

(11) Laser firing logs shall be maintained by each unit and a copy of the log will be delivered to the Range Safety Office upon completion of training per reference (b).

(12) The laser exit port (aperture) must be covered whenever the laser is not engaged in tactical operations on a laser range.

(13) Range guards with radios and portable laser hazard signs (available through Range Safety) must be posted at each of the access routes to a ground laser range.

(14) Lasing shall cease if communication is lost with any of the personnel participating in the laser training. Units conducting laser operations must maintain constant communication with BEARMAT, and shall cease laser operations if communication is lost. Lasing is not to resume until communications with BEARMAT has been re-established.

6. Table G-1 identifies the laser systems, their NOHDs and required ODs authorized on MCAGCC.

7. MCAGCC has numerous LASER ranges located throughout the RTAs. The following RTAs have one or more LASER ranges or LASER TARGET AREAS (LTAs).

- A. America Mine
- B. Blacktop
- C. Bullion
- D. Cleghorn Pass
- E. Delta
- F. Emerson Lake
- G. Gays Pass
- H. Lava
- I. Lavic Lake
- J. Lead Mountain
- K. Noble Pass
- L. Prospect
- M. Quackenbush Lake
- N. Rainbow Canyon
- O. Range (Numbered Ranges)
- P. Sunshine Peak

8. MCAGCC has several different types of LASER Ranges. These are:

- A. Ground Laser Ranges.
- B. Aerial Laser Ranges (Fixed Wing)
- C. Aerial Laser Ranges (Rotary Wing)

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D. Armor Maneuver Ranges (Tank)

E. Composite Ranges (Multiple function, i.e.. ground, rotary and armor)

NOTE: INFORMATION REGARDING LASER RANGES AND THEIR USE CAN BE OBTAINED AT RANGE SAFETY (BLDG 1559) OR CALLING DSN 230-7112/6576 OR COMMERCIAL (760) 830-7112/6576.

9. In the event of a LASER eye injury or suspected LASER eye injury, immediately transport the victim to the Naval Hospital to be evaluated by the Optometrist. Reference (e) requires that photos of the suspected injured eye must be taken at the earliest possible time.

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LASER WEAPON SYSTEM	BUFFER (MRAD)	WAVELENGTH	NOMINAL OCULAR HAZARD DISTANCE			OPTICAL DENSITY	
			OPTICS (Km)			OPTICS	
			EYE	8cm	12cm	UNAID	AID
TADS/PNVS (AAH-TADS)A	5	1,064	26	68		4	5.5
LAAT (AH-1S)A	5	1,064	5	15	30	3.5	4.8
MMS (OH-58D)A	5	1,064	35			4.1	5.3
AN/AVQ-25 (F-111) PAVE TACK A	5	1,064	16	52	70	4.3	5.8
AN/AAS-33A (A-6E TRAM)A	5	1,064	14.6	58	58	4.6	5.8
AN/AAS-37 (OV-10D NOS)A	5	1,064	11.2	56	59	5.2	5.6
AN/AAS-38A (F/A-18 LTDR)C,1	5	1,064	17	63	73	4.3	5.4
LANTIRN, LTDR A,2	5	1,064	22.7			44.15	
NITE EAGLE LTDR B (MULTI-PULSE TO GROUND)	5	1,064	15	54.9	64.6	4.1	5.2
AN/ASQ-153 (F-4E PAVESTRIKE)A	5	1,064	10	48	58	4.2	5.6
LANTIRN RANGEFINDER A,2,3	5	1,540					
CLD A, HANDHELD	10	1,064	9.7	48	58	4.5	5.4
LLTD A, HANDHELD	10	1,064	7	38		4	4.9
AN/GVS-5 A HANDHELD	10	1,064	2.7	21	27	3.7	4.4
AN/PAQ-1 (LTD)A HANDHELD	10	1,064	7	15	33	4.2	5.8
AN/GAQ-T1 (LDSS) B TRIPODE (NO LENS)	5	1,064	12.7	54.4	62.5	4.4	5.4
AN/GAQ-T1 (LDSS) B,4 TRIPOD (2X LENS)	5	1,064	4	19.3	33.2	5	5.4
AN/GAQ-T1 (LDSS) TRIPOD (5X LENS)	5	1.06	1.7	9.8	19	5.4	5.4
AN/GAQ-T1 (LDSS)B,4 TRIPOD (10X LENS)	5	1,064	0.9	5.5	11.5	5.4	5.4
AN/TVQ-2 (GVLLD) A TRIPOD	2	1,064	25	80	87	3.8	5.5
AN/PAQ-3 (MULE) A TRIPOD	2	1,064	20	64	78	3.9	5.6
AN-PAQ-3 (MULE) A TRIPOD, NIGHT	5	1,064	20	64	78	3.9	5.6
AN/PAQ-3 (MULE) A HANDHELD	10	1,064	20	64	78	3.9	5.6
AN/PAQ-3 (MULE)A HANDHELD NIGHT	15	1,064	20	64	78	3.9	5.6
SOFLAM B(10 SEC EXP)	5	1,064	9.6	45	54	4	5.3
F-117	5	1,064	18.5	45	56	4.5	6
AN/ASQ-211 NTS LDRS (AH-1W)	5	1,064	15	48	59	3.5	5.2

Table G-1,--LASER SYSTEMS

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LASER WEAPON SYSTEM	BUFFER (MRAD)	WAVE LENGTH	NOMINAL OCULAR HAZARD DISTANCE			OPTICAL DENSITY	
			OPTICS (KM)			OPTICS	
			EYE	8 cm	12 Cm	UNAID	AID
AN/GVS-5 (19DB RED FILTER)	10	1,064	0.29	1.8	1.8	3.7	4.4
AN/GVS-5 (29DB YELLOW FILTER)	10	1,064	0.05	0.55	0.55	3.7	3.7
AN/VVG-3 (MIAI)	5	1.064	7	35	44	4.7	4.7
AN/PEQ-2 (ITPIAL) AIM MODE, LOW-PW	0	830	0	0	0	0	0
AN/PEQ-2 (ITPIAL) DUAL, LOW MODE	10	830	0.07	0.61	0.88	2.2	2.2
AN/PEQ-2 (ITPIAL) DUAL, HIGH MODE	10	830	0.26	1.81	2.8	2.2	2.2
AN/PEQ-2 (TPIAL) AIM OR ILLUM LOW	0	830	0	0	0	0	0
AN/PEQ-2 (TPIAL) DUAL, LOW MODE	10	830	0.02	0.16	-	0	0
AN/PEQ-2 (TPIAL) DUAL, HIGH MODE	10	830	0.22	1.3	-	2	2
AN/PEQ-4 (MPLI)	10	850-870	.28	2.9	4.8	3.2	3.2
AN/PVS-X (MLRF)	1600**	1,064	3	16	29	3.7	3.7
AN/PVS-6 (MELIOS)	10	1,540	0	0.02	0.04	0	0
IZLID-2	10	870	0.03	1.63	2.55	3	3
AIM-1/DLR	10	830	0.24	1.56	2.43	1.7	1.7
LPL-30	10	800-850	0.1	0.68	1.1	1.7	1.7

SOURCES FOR DATA IN TABLE

- A MIL-HDB-828 OF 15 APRIL 1993
 B LSRB MINUTES OF 1992
 C LSRB MINUTES OF 1993

NOTES:

1. LIMITED USE AS REQUIRED BY OPERATIONAL NECESSITY SEE LSRB MINUTES SER 223-2/007 OF 25 JANUARY 1993
 2. THIS SYSTEM WAS TESTED BY BROOKS AIR FORCE BASE WHICH USES 2 MRAD AS THEIR BUFFER ZONE. HOWEVER, THE NAVY IS RESTRICTING THE BUFFER ZONE TO 5 MRAD.
 3. THE AIR FORCE CONSIDERS THE OPERATIOAL PARAMETERS OF THE RANGEFINDER MODE TO BE OPERATIONALLY EYESAFE DUE TO THE WEAK PULSE AND TIME BETWEEN PULSES.
 4. THERE IS A SKIN HAZARD DISTANCE AND A DIFFUSE REFLECTOR DISTANCE. SEE LSRB MINUTES SER 223-2/191 OF 16 JANUARY 1992.
- ** 90 DEGREES BUFFER ZONE REQUIRED FOR RCA VERSION AN/PVX=S-X WITH SECONDARY BEAM; 10 DEGREES FOR BRUNSWICK VERSION.

Table G-1,-- LASER SYSTEMS

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APPENDIX H

PROCEDURES FOR DELIVERY OF AVIATION ORDNANCE

1. General. Due to the nature of training conducted aboard MCAGCC, the delivery of aviation ordnance is generally conducted in close proximity to and requires detailed integration with ground maneuver forces. However, there are times when aviation units may conduct internal training that is not done in conjunction with any ground unit or aircraft may need to utilize the NORDO Hung Ordnance/Free Drop Zone. The degree of control, coordination, and safety considerations will differ greatly between these three types of ordnance delivery scenarios, therefore, this Appendix shall differentiate the regulations and requirements for each of the following:

- a. Aviation ordnance delivered in exclusively scheduled Range Training Areas RTA(s) by aviation units which are not operating in conjunction with ground forces.
- b. Aviation ordnance delivered while operating in conjunction with ground forces.
- c. Aviation ordnance delivered in the NORDO Hung ordnance/Free Drop Zone (FDZ).

2. Aviation ordnance delivery restrictions. The following restrictions apply to all aviation ordnance deliveries.

- a. The following weather minimums apply for all ordnance delivery missions.

(1) Fixed Wing (Day/Night)

Ceiling 3,000/5,000 feet
Visibility 3/5 miles

(2) Rotary Wing (Day/Night)

Ceiling 500/1,000 feet
Visibility 1/3 miles

- b. Ordnance delivery is not authorized during Instrument Meteorological Conditions (IMC).

- c. All aircraft are required to carry a 1:50,000 OR 1:100,000 scale map in the cockpit while operating aboard MCAGCC.

- d. Aircraft shall carefully plan their ordnance release so that the ordnance and the effects of the ordnance shall not impact any closer than 1000 meters from the internal ground base boundary or the boundary of the specific RTA(s) assigned.

CAUTION: The airspace of R-2501 does not mirror the MCAGCC groundspace in all areas. At some locations, it is possible for aircraft to be within the confines of R2501 and not be overflying MCAGCC groundspace. Prior to flight operations aboard MCAGCC, aircrews shall conduct a detailed map study to include identifying these areas in order to prevent the occurrence of inadvertent off base ordnance deliveries (Figure 7-1).

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e. Ordnance or the effects of the ordnance shall not impact inside any permanently established No Fire Area (NFA). See Chapters 9 and 10 for more information on the locations of all permanent NFAs.

f. Positive identification of any target is required prior to the delivery of aviation ordnance.

g. Aircraft must immediately cease ordnance delivery if a Red smoke or flare is observed.

3. Ordnance Delivery in Exclusively Scheduled Range Training Areas RTA(s).

Aircraft that have exclusively scheduled RTA(s) for internal ACE/squadron training and are not operating in conjunction with any ground forces may deliver ordnance without the requirement for a terminal controller (FAC/FAC(A)) giving clearance to drop. In addition to the Safety regulations already delineated in this manual, the following safety precautions are mandatory and shall be strictly adhered to:

a. The aircraft must receive specific clearance into the RTA(s) from BEARMAT. Bearmat will pass the aircraft on to the exercise force DASC when applicable.

b. Aircraft shall monitor BEARMAT and Guard frequencies while operating in the RTA(s). Aircraft will monitor the DASC when it has control.

c. The flight leader assumes the responsibility as Range Safety Officer for the entire flight and shall ensure that every aircraft in the flight complies with all range regulations.

d. A clearing pass is required to visually confirm all targets are clear prior to dropping any ordnance.

e. If any ground forces are observed in the assigned RTA(s), aircraft shall report it immediately to BEARMAT and no ordnance shall be dropped until the conflict is resolved. Aircraft will report to the DASC if under their control.

f. If a red smoke or flare is observed in the assigned RTA(s), aircraft shall cease delivering ordnance and report the observation to BEARMAT (DASC, if applicable). Aircraft must receive approval from BEARMAT to resume ordnance deliveries. Aircraft must receive approval from the DASC if under their control.

g. Aircrews shall be especially cognizant of the large Surface Danger Zone (SDZs) and splash patterns of most Precision Guided Munitions (PGMs). Prior to employment, aircrews shall consult applicable Tactical Manuals, abide by restrictions contained in paragraph 5 of this Appendix and must receive specific prior approval from Dir, O & T for the delivery of this type of aviation ordnance.

h. Aircrews employing lasers should consult Appendix G for additional information.

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4. Ordnance delivery while operating in conjunction with ground forces. The following regulations apply when aircraft are operating in close proximity to and/or in conjunction with ground forces.

a. The delivery of aviation ordnance short of the Fire Support Coordination Line (FSCL) must be conducted under the positive control of a terminal controller (FAC or FAC(A)) qualified and designated by current directives. Airstrikes beyond the FSCL do not require a terminal controller. Unless specifically delineated by exercise force directives, the FSCL shall be defined as I-40.

b. Air Officers and Forward Air Controllers (FAC)/Forward Air Controllers (Airborne) (FAC(A)) assume a grave responsibility during live fire exercises to ensure Close Air Support (CAS) is safely executed in close proximity to ground forces and deconflicted from the effects of other weapons systems. They shall be guided in the performance of their duties by applicable FMFMs, (MCWP's when issued) and Tactical Manuals. The following responsibilities, although not all inclusive, are provided because they have an especially important impact on safety:

c. Air Officer responsibilities:

(1) Coordinate the use of CPs with the DASC for the holding of aircraft to ensure airspace/altitudes are deconflicted.

(2) Clear all CAS briefs with the FSC to ensure deconfliction of aircraft and indirect fire weapons.

(3) Coordinate with the FSC on the establishment and disestablishment of informal Airspace Coordination Areas (ACAs) to ensure deconfliction of aircraft and indirect fire weapons.

d. Forward Air Controller (FAC/FAC(A)) responsibilities:

(1) The FAC/FAC(A) shall operate well forward near lead trace of friendly forces in order to observe targets and stay abreast of the enemy situation.

(2) FAC/FAC(A)s shall ensure that friendly positions are known to the aircraft. In addition to the information contained in the CAS brief, FAC/FAC(A)s shall make known the positions of units or weapons systems that could be easily mistaken for the target.

(3) The FAC/FAC(A) will issue a doctrinal CAS brief to the aircraft and, when necessary, specify attack quadrants, minimum or maximum altitude restrictions and/or special routing instructions.

(4) FAC/FAC(A)s are charged with the ultimate determination of whether or not an aircraft should be "Cleared Hot." This is a grave responsibility and cannot be delegated. A "Cleared Hot" will only be issued when all of the following criteria have been met.

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(a) The FAC/FAC(A) must have visual contact with the aircraft and the intended target.

(b) The aircraft is no longer in a turn and is pointed at the intended target.

(c) The aircraft must be forward of the Forward Line of Troops (FLOT); i.e.: aircraft must not be over friendly troop positions.

(d) The aircraft must not be pointed back at friendly troop positions.

(e) Two way communications must exist between the FAC/FAC(A) and the aircraft delivering ordnance during the time the aircraft approaches the point of ordnance release. Receiver only aircraft are not authorized to drop ordnance. Clearances shall not be relayed by another person or aircraft.

NOTE: PRELIMINARY BRIEFS MAY BE RELAYED THROUGH OTHER AGENCIES SUCH AS THE DASC, AIR OFFICER, OR OTHER AIRCRAFT.

CAUTION: There is no substitute for precise terminology and positive control. CONDITIONAL CLEARANCES (i.e., "you're cleared hot if you've got the smoke ... you're cleared hot if you've got the target in sight etc.") ARE NOT AUTHORIZED. The aircraft is either cleared hot or aborted by the terminal controller.

e. FAC/FAC(A) Terminology. The following doctrinal terminology shall be utilized by all FAC/FAC(A)s for the terminal control of FWCAS/RWCAS within the FSCL.

(1) "CONTINUE". A call given by the terminal controller to indicate the last transmission of the attacking was received and that clearance to release ordnance is forthcoming. It DOES NOT constitute clearance to drop.

(2) "CLEARED HOT". A call given by the terminal controller to the attacking aircraft that constitutes clearance to fire or release ordnance. Aircrews shall not fire or release ordnance unless this transmission is received. This transmission shall not be relayed by a third party; it must be issued by the terminal controller directly to the attacking aircraft. The clearance applies only to the attacking aircraft (unless buddy bombing). Other aircraft must receive their own individual clearances. This transmission shall not be coded.

(3) "ABORT, ABORT, ABORT". Call given by the terminal controller instructing the attacking aircraft not to release ordnance and terminate the attack. Ordnance shall not be released if this transmission is received even if a "Cleared Hot" had previously been given. Unless otherwise specified by the terminal controller, this command applies only to the attacking aircraft, other aircraft in the flight should continue.

(4) "CLEARED FOR AN IMMEDIATE REATTACK". Call given by the terminal controller to the attacking aircraft constituting clearance to remain in the target area and conduct another attack on the same target. This call does not constitute clearance to drop ordnance on subsequent runs, but, is merely a clearance to reposition for another attack. All previously discussed terminology is applicable.

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f. Marking of Targets. Targets should normally be marked but this is not an absolute requirement. Aircraft may be "talked onto a target" if a mark is not available. The following restrictions apply for marking a target during RWCAS/FWCAS missions.

(1) Laser designators. Ground based and airborne laser designators may be used to mark targets with the following restrictions:

(a) The FAC/FAC(A) exercising final control and responsibility for designating the target shall have received training on the equipment from EWTGPAC/LANT or the appropriate aircraft syllabus.

(b) The designator shall be positioned as high as possible relative to the target to preclude spillover and interference from foliage and terrain.

(c) There is a 20 degree safety zone whose apex is at the target and extends 10 degrees either side of the Target-to-Laser Designator line. Aircraft attacks shall not be planned within this 20 degree safety zone (Figure H-7).

(d) Aircraft must be forward of the FLOT before receiving a clearance to drop.

(e) Consult Appendix G for more information regarding laser employment.

(2) Target Marking by Indirect Fire Weapons. The following ordnance may be used for mark targets with indirect fire weapons.

(a) White Phosphorous (WP).

(b) Red Phosphorous (RP).

(c) Illumination rounds burning on the ground.

(d) Artillery smoke rounds (if available).

CAUTION: Under no circumstances will high explosive (HE) rounds be planned as a mark from an indirect fire agency. In the event that the planned mark falls out and HE rounds are impacting in the target area, HE rounds may be used to orient the aircraft onto the target. HE rounds impacting in the target area shall not be referred to as the "Mark" but shall be referred to as "Suppression." In circumstances such as this it is critical that the FAC/FAC(A) differentiate the HE suppression rounds impacting in the target area from the smoke/dust cloud created by artillery and tank muzzle blasts. This is particularly important for tanks since they are often much closer to the target area than artillery and since they frequently fire rounds from defilade positions where the tank muzzle is quite close to the ground and large dust clouds are created by the muzzle blast.

NOTE: DUE TO THE WIDE VARIETY OF USES FOR SMOKE IN FIRE AND MANEUVER EXERCISES, CONFUSION OCCASIONALLY EXISTS REGARDING THE PURPOSE FOR SPECIFIC SMOKE OR WHITE PHOSPHORUS (WP) MISSIONS. SINCE WHITE SMOKE OR WP ARE THE MOST COMMON MEANS OF DESIGNATING TARGETS FOR FIXED WING CLOSE AIR SUPPORT (FWCAS) AND ROTARY WING CLOSE AIR SUPPORT (RWCAS) MISSIONS, A POTENTIAL DANGER EXISTS WHEN FWCAS/RWCAS IS BEING

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EMPLOYED WITH MANEUVERING TROOPS AND EQUIPMENT IN LIVE FIRE TRAINING. SMOKE WHICH IS USED TO SCREEN MOVEMENT FROM ENEMY OBSERVATION (SELF SCREENING SMOKE) IS PROVIDED BY SEVERAL MEANS BY VEHICLES AND PERSONNEL. IT IS NORMALLY PROVIDED IN CLOSE PROXIMITY TO MANEUVER ELEMENTS THAT CAN EASILY BE MISTAKEN FOR TARGET MARKING SMOKE IF NOT PROPERLY COORDINATED. TO PRECLUDE TRAINING ACCIDENTS, THE USE OF SELF- SCREENING SMOKE DURING A CAX OR OTHER COMBINED ARMS TRAINING MUST BE APPROVED BY THE UNIT FIRE SUPPORT COORDINATOR (FSC) AND THE SENIOR TTECG MANEUVER REPRESENTATIVE. PRIOR TO ISSUING APPORVAL, THE FSC WILL ENSURE THAT THERE ARE NO SAFETY CONFLICTS WITH FWCAS/RWCAS MISSIONS IN PROGRESS. FOR THE PURPOSE OF THIS APPENDIX, "SELF- SCREENING SMOKE" IS DEFINED TO INCLUDE TANK SMOKE GRENADES LAUNCHERS, SMOKE GENERATORS, AND HAND THROWN HC SMOKE GRENADES.

(3) Target Marking by Aircraft. The following aviation delivered ordnance may be used to mark targets.

- (a) White Phosphorous (WP) rockets.
- (b) Red Phosphorous (RP) rockets.
- (c) Inert Rockets.
- (d) Inert Ordnance with smoke charges (Mk-76, BDU-48, etc.)

NOTE: A FAC(A) MARKING A TARGET IN CONJUNCTION WITH HIS OWN TERMINAL CONTROL CAN CLEAR HIMSELF HOT ON THE MARKING RUN. HE IS SUBJECT TO ALL OTHER ORDNANCE RELEASE RESTRICTIONS DELINIATED IN THIS APPENDIX.

g. Aviation Delivered Illumination. When fixed or rotary wing aircraft drop flares (LUU-2A/B, Mk-45), the Forward Line of Troops (FLOT), manned NFAs, winds aloft, and aircraft run-in headings must all be considered. This is due to chute collapse with suspension line cut at flare burnout and the possibility of improper delivery altitude/ignition settings or flare parachute malfunction. Under no circumstances will the flare delivery pattern be located over or behind friendly positions and shall be parallel or away from the FLOT. Winds and drift shall be calculated to result in flare burnout/chute collapse no closer than 2,000 meters from the FLOT. When flares are delivered under the control of a FAC/FAC(A), a "Cleared Hot" is required.

h. Aircraft Final Attack Headings/Cones. The greatest margin for safety of ground troops is a final attack heading/cone parallel to the FLOT, but this is not always possible without seriously detracting from the reality of training. Therefore final attack headings/cones may be varied per Figure H-1 when executing visual FWCAS missions. RWCAS Attack Positions (APs) shall be defined in a way so that all firing positions within the AP provide an acceptable heading for the attack on the intended target. Under no circumstances will FWCAS or RWCAS be cleared hot for the release of ordnance if during the terminal phase of the attack, the aircraft heading is pointed towards friendly troops. When this circumstance arises, the aircraft shall immediately be aborted. Additionally, when attack headings/cones are over the heads of friendly troops, a cleared hot will not be given and no ordnance

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will be fired/released until the aircraft is forward of the FLOT in order to preclude short hits. Additional restrictions apply to accelerated (loft) attacks and are delineated in Figure H-2.

i. Identification Runs. Identification runs are not required. Aircraft may be cleared not to drop live ordnance on the first pass.

j. Aborting Attacks. The terminal controller shall terminate an aircraft attack by transmitting "ABORT, ABORT, ABORT" when any of the following conditions exist:

(1) Red smoke or flare is observed.

(2) Aircraft cannot identify the target area or is not pointed at the intended target.

(3) Run appears to be unsafe (bad final attack heading, etc.).

k. Safe Separation Distances

(1) The distances discussed here are designed to provide safe separation for troops under the following conditions in open terrain.

(a) Troops shall wear helmets and flak jackets.

(b) Troops should be in a prone position to observe the airstrike. Use of protective cover is always recommended, if available. Troops must be cautioned that "maverick" fragments sometimes travel considerably farther than the safe separation distances.

(2) A minimum of 1,000 meters safe separation distance shall be used for all aviation-delivered ordnance with the following exceptions:

(a) CS Spray (Aero 14B tank):	0
(b) Any loft-delivered ordnance:	2,000 meters
(c) Mk-82 HE bombs (500 lbs):	1,500 meters
(d) Mk-83 HE bombs (1,000 lbs):	2,000 meters
(e) Mk-84 HE bombs (2,000 lbs):	3,000 meters
(f) Fuel Air Explosives (FAE):	2,000 meters

5. Additional Restrictions for Special Weapons. Special safety considerations exist when employing Precision Guided Munitions and other special weapons and are applicable to all aviation ordnance deliveries. The following regulations apply:

a. Antiradiation Missiles (ARM). These weapons are subject to a wide variety of interference and their delivery tactics are subject to numerous peacetime restrictions. The appropriate tactical order must be consulted prior to employing

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these weapons. Use appropriate "footprint" tables for type of weapon and type delivery to determine splash pattern/ safe separation distance. Additionally, consult TTECG (for CAX events))prior to employment to ensure the safe separation of friendly troops in the event of a malfunctioning emitter or missile.

b. IR/Laser Maverick. This weapon has a large "footprint" that varies based on aircraft delivery parameters. Consult appropriate "footprint" tables in the applicable Tactical order to determine splash pattern/safe separation distance.

c. CBU. CBU ordnance is authorized for delivery in Range 601 only. Prior coordination and approval by the Dir, O & T is required.

d. Hellfire. HELLFIRE missile engagements can either be in the (LOBL) Lock-on-Before-Launch or the (LOAL) Lock-on-After-Launch mode. The aircrew and FAC/FAC(A) will confirm the grid of the designated target with a LASER rangefinder prior to missile launch. The Weapons-to-Target line (WTL) shall be oriented so that troops and remote LASER designators (ground and airborne) are outside the SDZ and backblast areas. Refer to Figure H-3 for dimensions of the HELLFIRE SDZ. The backblast area is defined as 50 meters to the rear and 15 meters to either side of the launch aircraft. The angle between the Laser-to-Target line (LTL) and the WTL shall never exceed 60 degrees for either ground or airborne designators. The vertical hazard from the HELLFIRE missile extends upward along a 40 degree angle to 22,000 feet out to a range of 13,000 meters. If rain conditions are present during launch, all attempts should be made to keep the LASER designator dry and clear.

e. Airborne Launched TOW. The airborne TOW missile will not be fired over the heads of troops. The line of sight from the launcher to target should be perpendicular to the FLOT when possible and never at less than a 47 degree angle away from the FLOT (i.e., the TOW may not be fired parallel to the FLOT) as depicted in Figure H-4.

(1) The diagram of the SDZ for TOW is shown in Figure H-5. This zone is based on the maximum ballistic range of the airborne TOW missile since there is no provision for "COMMAND DESTRUCT."

(2) The SDZ (Figure H-5) consists of the impact area and areas A, B, C and E. The entire surface danger area will be clear of all personnel prior to firing the missile.

(3) When the airborne TOW missile is fired, a danger area is created behind the helicopter as depicted in Figure H-6, Area C. This area forms a 90 degree arc extending 45 degrees to each side of the launcher, out to a distance of 50 meters. Additionally, the caution area that extends 25 meters beyond the danger zone should be avoided.

f. Laser Guided Bombs (LGBs)/Guided Bomb Units (GBUs). The following restrictions apply for the delivery of LGB/GBUs:

(1) All restrictions contained in paragraph 4f(1) concerning the use of a laser designators for marking targets shall apply for LGB/GBUs.

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(2) Pilots delivering LGB/GBUs shall be thoroughly familiar with all aspects of LST/LGB operations as discussed in current Tactical Manuals (TACMAN) and other operational publications. Emphasis should be placed on the delivery envelope.

(3) The delivery aircraft shall be equipped with a functional Laser Spot Tracker (LST) and the LGB/GBU will not be released unless the aircraft LST has had a "lock" on the laser spot and the pilot confirms the spot is on the intended target.

(4) Any tactically feasible delivery maneuver may be employed as long as proper safety data has been applied by the delivery pilot in the event the weapon should fail to guide and go ballistic.

(5) LGB/GBUs shall not be released within the 20 degree safety zone (10 degrees either side of the Target-to-Designator Line). This restriction applies to both stationary ground laser designators and airborne (rotary wing) laser designators.

(6) The optimum aircraft attack cone is a 120 degree fan whose apex is the target and extends 60 degrees either side of the Target-to-Laser Designator Line excluding the 20 degree safety zone previously mentioned (Figure H-7). If the attack angle is greater, the seeker may not receive enough reflected energy to sense the laser spot. Attacks shall be planned within the optimum aircraft attack cone.

(7) All of the following must be met before a "Cleared Hot" is given by the FAC/FAC(A) and the aircraft releases an LGB/GBU.

(a) Aircraft delivering the LGB/GBU must be outside the 20 degree safety zone previously described.

(b) Aircraft must be forward of the FLOT.

(c) Aircraft must not be in a turn and must be pointed at the intended target.

(d) Aircraft is receiving a valid laser spot as determined by the LST.

(e) The pilot has visually verified that the laser spot corresponds with the intended target.

NOTE: ALTHOUGH NOT MANDATORY, A SECONDARY MARK SHOULD BE PLANNED SINCE IT WILL AID THE PILOT IN VISUALLY VERIFYING THE LASER SPOT CORRESPONDING TO THE INTENDED TARGET.

6. TDD. The MK-43 Target Detecting Device (TDD) will not be used with electrical aerial bomb fuzes when operating in conjunction with maneuvering troops or vehicles.

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6. Ordnance deliveries in the NORDO Hung Ordnance/Free Drop Zone

- a. The Sunshine Peak RTA is the designated NORDO Hung Ordnance and Free Drop Zone (FDZ) located aboard MCAGCC. Exceptions may be authorized on a case-by case basis by the Dir, O & T.
- b. All aircrews must receive a brief from BEARMAT or the exercise force DASC in control of R-2501 prior to utilizing the FDZ. Aircraft are required to conduct a cold, low level ID pass over the FDZ to confirm it is clear of all personnel prior to dropping any ordnance.
- c. Specific requirements for the establishment of a FDZ outside of Sunshine Peak RTA during CAX Program events are addressed in paragraph 8008.
- d. At no time will the America Mine RTA be authorized as a hung ordnance/FDZ.

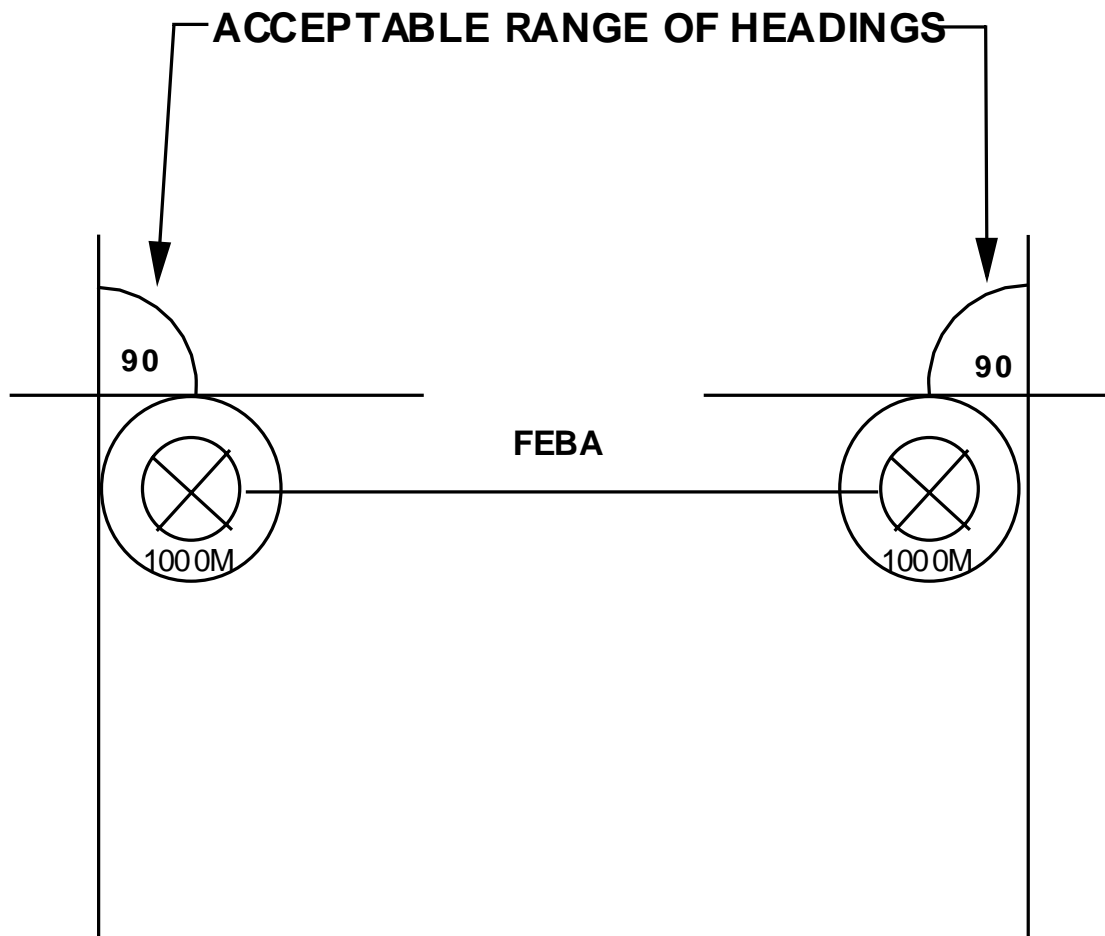


Figure H-1.--Straight Path (Unaccelerated) Attacks

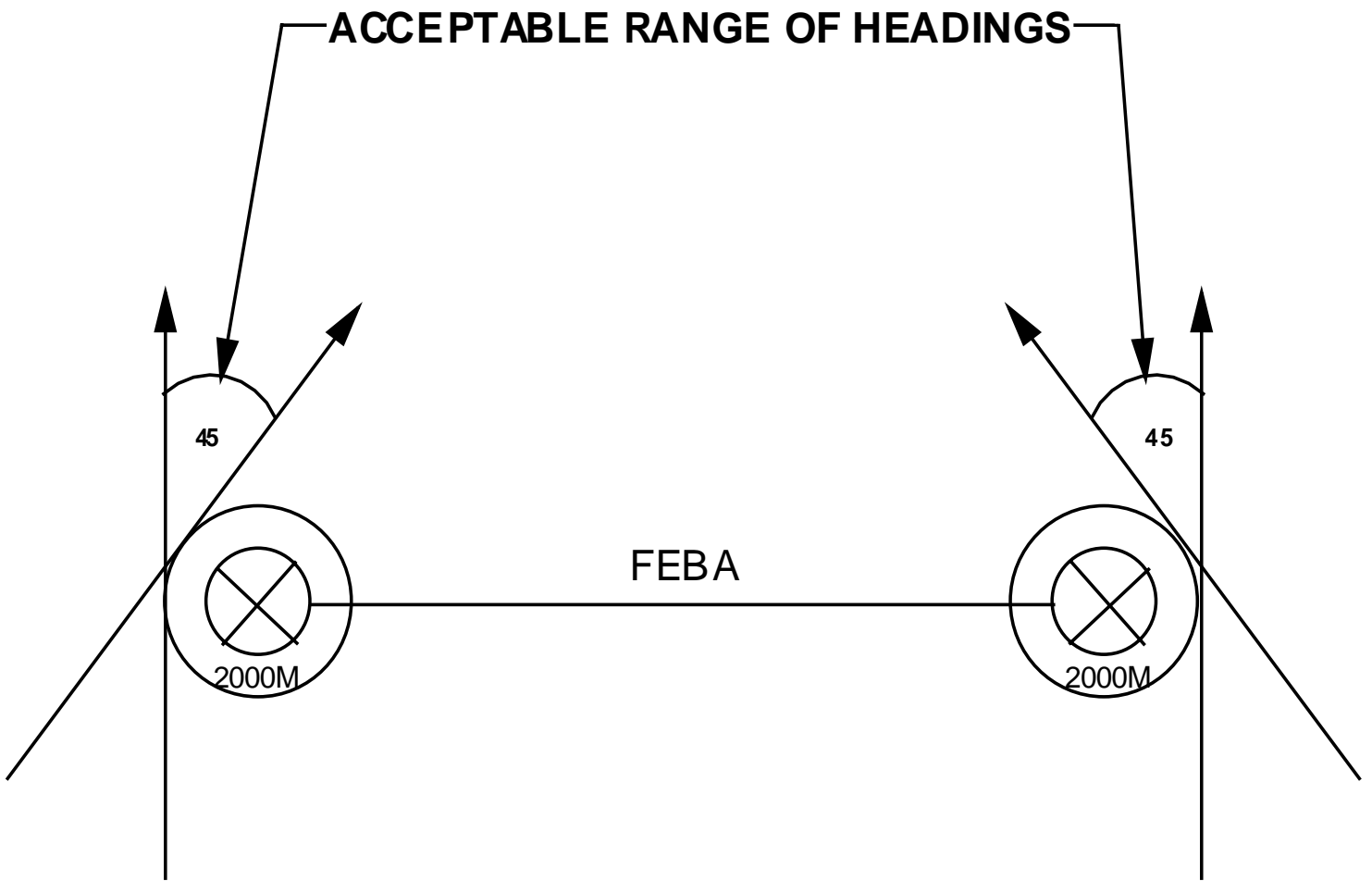
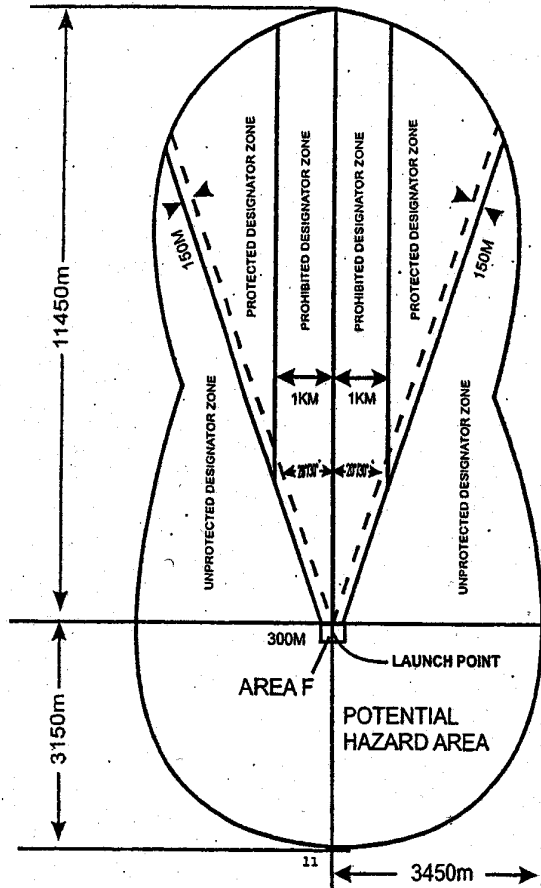


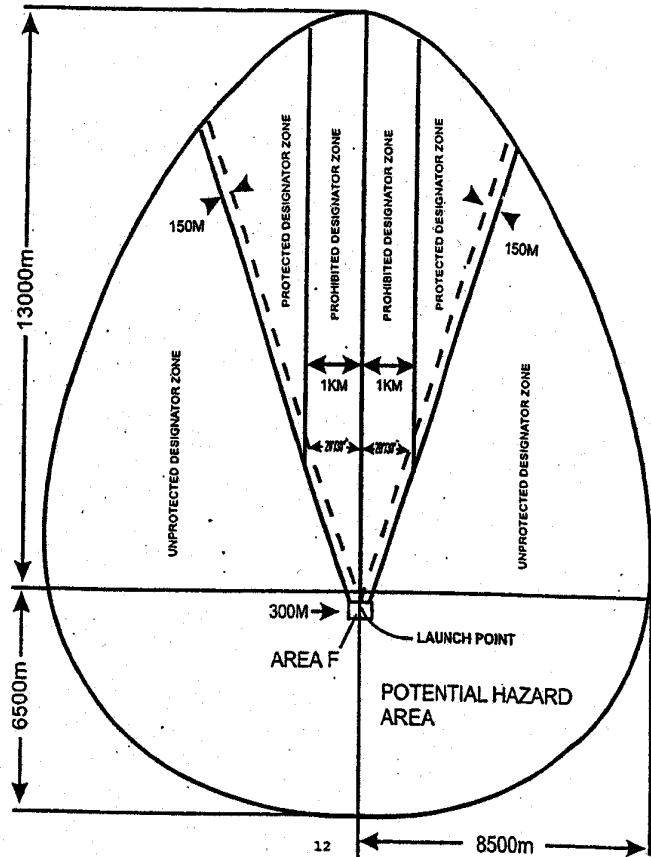
Figure H-2.--Accelerated (Loft) Attacks

SDZ for firing Hellfire laser guided missile in the Direct Launch (lock-on after or lock on before launch mode) at fixed target



* When firing in a lock-on-after launch 30° angle will be used

Surface danger zone for firing Hellfire laser guided missile in the indirect launch (lock-on after launch mode) at fixed target



* When firing in a lock-on-after launch 30° angle will be used

PROHIBITED DESIGNATOR ZONE

Hazardous Area; No designator operators allowed

PROTECTED DESIGNATOR ZONE

Designator operators allowed;
Not vulnerable to normally functioning missiles

UNPROTECTED DESIGNATOR ZONE

Designator operators allowed;
Random missile failure may cause injury; safer than protected designator zone

POTENTIAL HAZARD AREA

Mission essential personnel only

Figure H-3.--Hellfire Surface Danger Zones (SDZ)

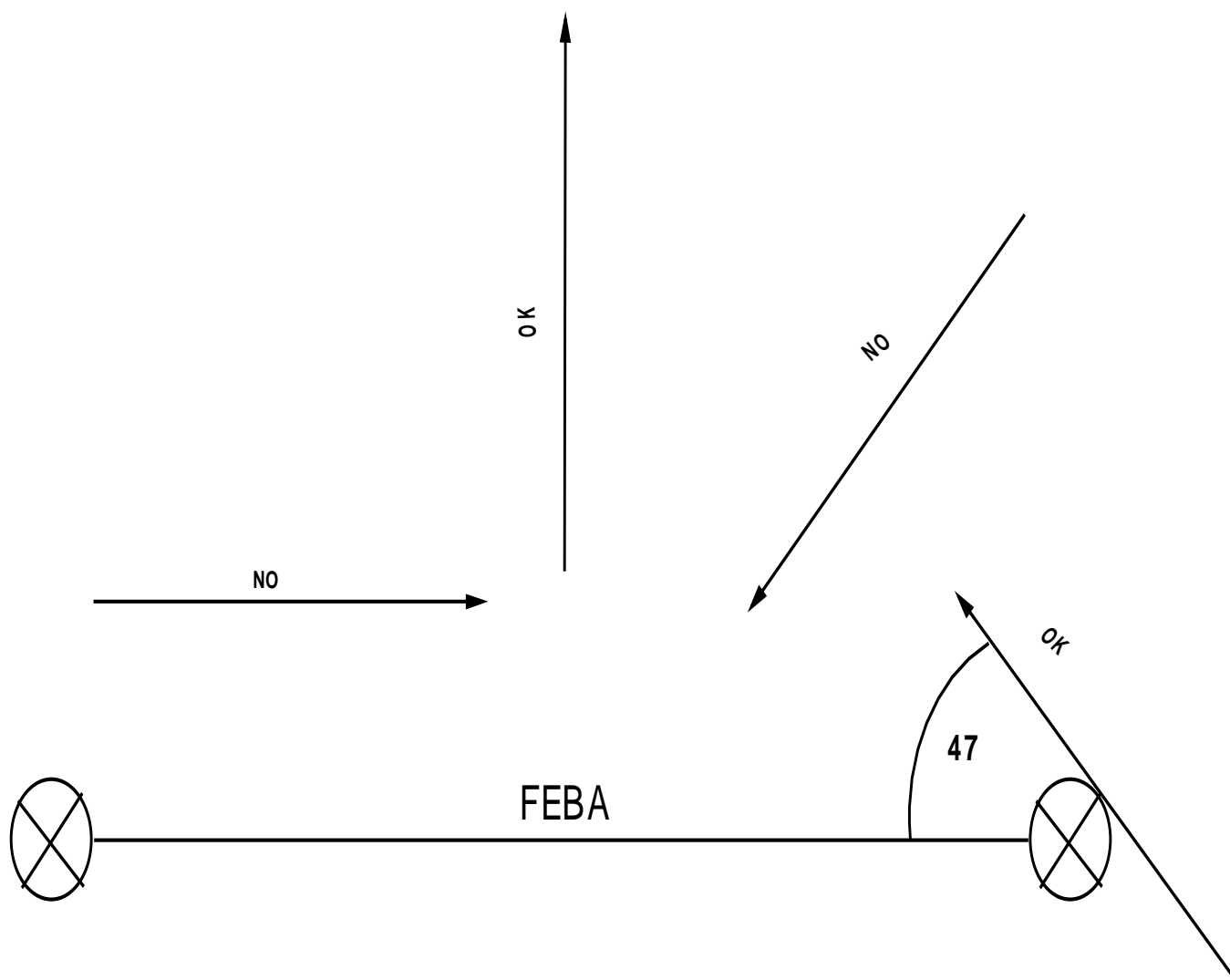
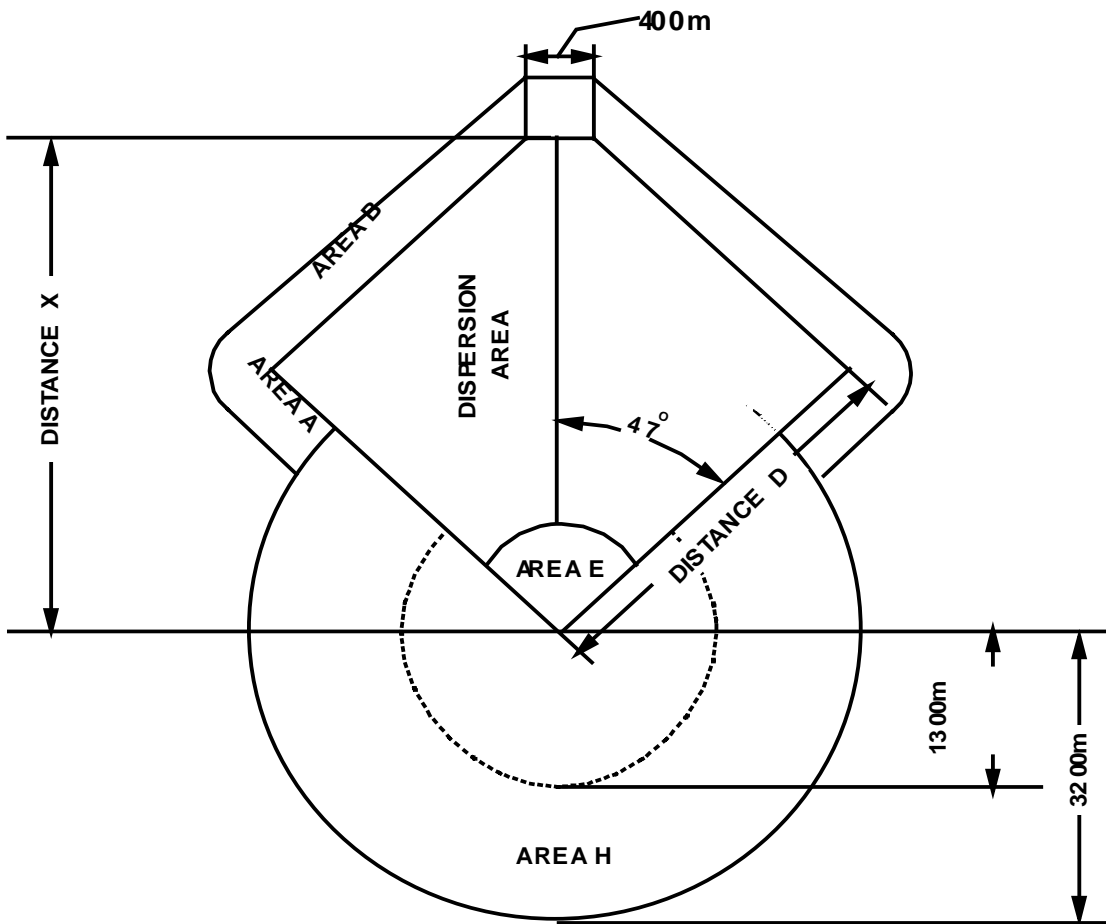


Figure H-4.--Airborne TOW Launch Angles

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Basic TOW. ITOW, TOW2, AND TOW 2A Missile Range Distance

GROUND		AERIAL				
Airspeed (Knots)	0	Hover	Hover 50	100	100	150
Altitude (Feet)	0	0-50	50-100	50-100	500	1,000
Distance X	5,000 m	5,100 m	5,300 m	5,500 m	5,700 m	6,000 m
Distance D	3,800 m	3,900 m	4,100 m	4,300 m	4,500 m	4,800 m

Basic TOW, ITOW, TOW2 AND TOW 2A Missile Danger Areas

	AREA A	AREA B	AREA H
Inert Warhead	100 m	100 m	Not Required
High Explosive Warhead	750 m	750 m	3,200 m

Figure H-5.--Airborne TOW Surface Danger Zone (SDZ)

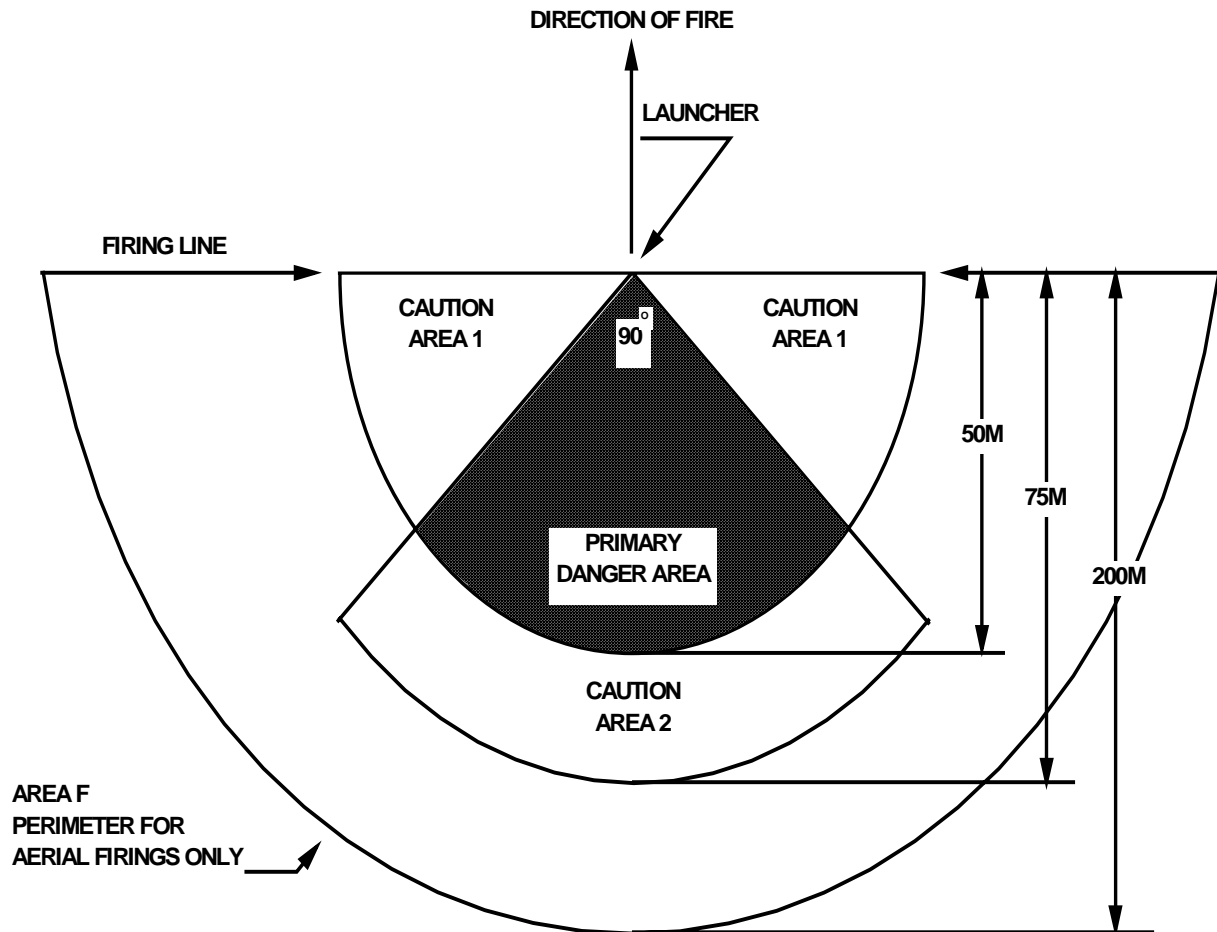


Figure H-6.--TOW Missile Backblast Area

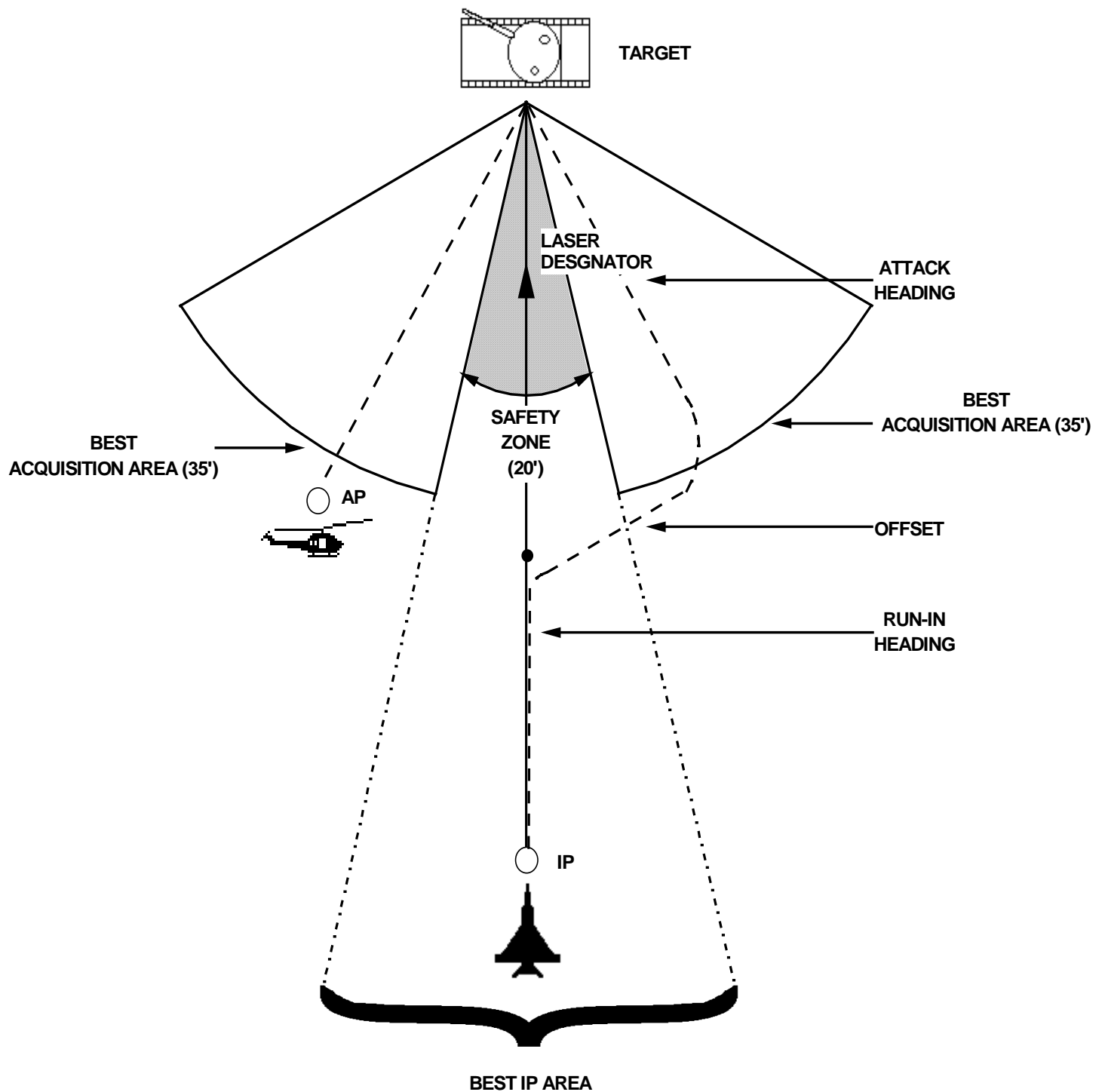


Figure H-7,--Safety Zone and Optimum Acquisition Area for Delivery of LGB/GBUs

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APPENDIX I

OPERATION OF UNMANNED AERIAL VEHICLES (UAV'S)

1. UAV Flight Operations. Unmanned Aerial Vehicles shall be operated only in visual meteorological conditions (VMC) and when it is forecast to remain VMC throughout the entire flight. The protected airspace within the SELF Class "D" Surface Area (CDSA) for UAV operations shall be known as the UAV Traffic Area (UAVTA). The base/runway facility used by the UAV unit(s) shall be known as the UAV facility.
2. Definition of the UAVTA. The location of the UAV facility near ALZ Sand Hill at coordinates NT74179230. When operational/activated, the UAVTA from the surface up to, but not including, 1,000 feet AGL will be established within the following dimensions: from a point 1,000 feet north of the center of the UAV runway, Point "A" (coordinates NT74179260)); via a line parallel to the runway centerline east 1.2 statute mile arc to Point "B" (coordinates NT76079250); via a clockwise 1.2 statute mile arc to Point "C" (coordinates NT72229270) located 1.2 statute mile west of Point "A" on a line parallel to the runway thence directly east to Point "A".
3. Activation of the UAVTA. Activation and use of the UAVTA will be controlled by the CO, Marine Wing Support Squadron 374 (MWSS-374) during times when the SELF CDSA is operational. During periods when the SELF is closed, use of the UAVTA will be coordinated with BEARMAT. Although the SELF CDSA is closed, the CO, MWSS-374, or a direct representative, shall be notified of the UAV operations.
4. UAV Procedures
 - a. Thirty minutes prior to UAV flight, the UAV unit will establish positive communications with Palms Tower and BEARMAT (SELF CDSA operational), or BEARMAT (SELF CDSA non-operational).
 - b. SELF CDSA Operational
 - (1) UAV operator(s) shall contact Palms Tower for permission to launch.
 - (2) Arriving UAV shall contact Palms "Tower" five minutes prior to entering SELF CDSA.
 - c. SELF CDSA Non-operational
 - (1) UAV operator(s) shall contact BEARMAT for permission to launch.
 - (2) Departing UAV shall report airborne and state direction of departure.
 - (3) Arriving UAV shall report entering UAVTA and safe on deck.
 - d. When UAVTA is operational for touch and go patterns the UAV operator(s) will notify the controlling agency prior to launch and when operations are suspended; and at all times remain within the UAVTA.

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e. During UAV operations an UAV flight schedule will be disseminated to CAX HHQ, BEARMAT, and SELF Ops. The UAV flights will be included in the CAX ATO.

f. The UAV operator(s) will obtain clearance from Palms Tower prior to departing the UAVTA and entering the SELF CDSA.

g. The UAV operator(s) will obtain clearance from Palms Tower prior to entering the SELF CDSA at the approved points from R-2501 (see arrival and departure procedures, paragraph 5, below).

h. The UAV operator(s) will contact BEARMAT, or the designated air control agency (i.e., DASC) upon departing the SELF CDSA.

i. The UAV operator(s) will contact BEARMAT prior to takeoff if Palms Tower is not operating.

j. The UAV operator(s) will contact BEARMAT prior to entering the SELF CDSA.

k. The UAV operator(s) will contact BEARMAT prior to landing if Palms Tower is not operating.

l. The UAV operator(s) will monitor the appropriate UHF/VHF frequencies of the controlling agencies and UHF/VHF guard frequencies during all flight operations. UAV operator(s) will continuously monitor BEARMAT's safety net and make hourly radio checks while the UAVTA is activated.

m. The UAV controlling agency will FAX or hand carry a flight profile for missions being flown prior to launch of the UAV.

5. Arrival and Departure. Arrivals and departures of UAVs require clearance from Palms Tower to transit SELF CDSA airspace. All UAVs will transit the SELF CDSA via the below routes.

a. Whiskey Route. The Whiskey Arrival/Departure Route is described as follows:

(1) Departure - After takeoff the UAV will climb directly west to cross grid coordinates NH690920 (Point Deceiver) at or above 2,000 feet AGL then proceed directly to the V/STOL facility. Overfly V/STOL at or above 3,500 feet AGL and then depart SELF CDSA.

(2) Departing UAV will report "DECEIVER," then V/STOL clearing the SELF CDSA and switching to BEARMAT.

(3) Arrival - UAV will enter the SELF CDSA via the V/STOL facility at an altitude of 3,500 feet AGL or above. The UAV will continue south and descend to cross grid coordinates NT689922 (Point Deceiver) at 2,000 feet AGL then directly east descending to land at the UAV facility.

(4) Arriving UAV will report entering SELF CDSA at V/STOL, Deceiver, and entering UAVTA.

b. Echo Route. The Echo Arrival/Departure route is described as follows:

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(1) Departure - After takeoff, the UAV will climb directly east cross grid coordinates NT799922 (Point Evasion) at or above 2,000 feet AGL, and then proceed directly to the Rifle Range. Overfly Rifle Range at or above 3,500 feet AGL, then depart SELF CDSA.

(2) Departing UAV will report "EVASION," Rifle Range, clear of SELF CDSA, and switching to BEARMAT.

(3) Arrival - UAV will enter SELF CDSA proceeding directly over Rifle Range at 3,500 feet AGL or above. The UAV will continue and descend to cross grid coordinates NT799922 (point evasion) at 2,000 feet AGL, then directly west to land at the UAV facility.

(4) Arriving UAV will report entering the SELF CDSA, Rifle Range, "Evasion", and entering UAVTA.

c. Routing. Routing to and from the training areas within the R-2501 will be provided by BEARMAT or the appropriate air control agency (i.e., DASC) currently in control of the airspace. UAVs will be handled with the same considerations as manned aircraft and deconfliction will be accomplished using combinations of routing, time, and altitude assignments.

d. Airspace Scheduling. The scheduling of airspace within R-2501 shall be per Chapter 2.

e. Communications. While conducting any flight operations within the SELF CDSA, the UAV operator(s) shall maintain continuous communications with Palms Tower. The primary means of communications shall be Single Channel Radio, with a direct land line used as a backup system. All radio communications will be conducted using standard military and aeronautical terminology and procedures.

f. Lost Communications/No Radio Procedures. If two-way radio communications are lost after takeoff, the UAV shall continue only as scheduled, complete the assigned mission, returning to the UAV facility via the most direct route avoiding known hot ranges. UAV operator(s) should be briefed on all hot ranges and ranges expected to go hot upon first contact with BEARMAT. The en route altitude will be 7,000 feet MSL. The UAV will execute the Whiskey arrival at the scheduled return time. Exceptions to the above are possible only with approval from Palms Tower and BEARMAT via other means of communications.

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APPENDIX J

CHECKLISTS FOR PASSAGE OF CONTROL OF THE R-2501

1. Under certain circumstances, units may request permission to assume control of portions of the R-2501 from BEARMAT. Guidance for specific circumstances in which passage of control is authorized is contained in paragraphs 2005, 6004 and 8007.
2. Prior to the first flight of any aircraft in support of the exercise, the exercise force Direct Air Support Center (DASC) shall schedule an Airspace Coordination Meeting with the Range Control Officer. Details of the intended use of the airspace will be discussed and procedures for the control of the R-2501 will be clarified by the Range Control Officer. Prior to actually assuming control, the appropriate Checklist for Passage of Control of the R-2501, contained in this appendix, must be reviewed and all requirements met by the exercise force DASC.
3. Control of the R-2501 conducted by an exercise force DASC is particularly difficult during CAX Pre-FINEX training. Therefore, a CAX Pre-FINEX Air Control Procedures and Responsibilities outline is included in this Appendix. The requirements of this outline will be reviewed during the Airspace Coordination Meeting.
4. There are three primary Passage of Airspace Control checklists:
 - a. CAX Pre-FINEX Passage of Airspace Control Checklist
 - b. CAX FINEX Passage of Airspace Control Checklist
 - c. Large Scale Exercise Passage of Airspace Control Checklist

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PRE-FINEX AIR CONTROL PROCEDURES AND RESPONSIBILITIES

1. During the Air Support Coordination Exercise (ASCEX), Fire Support Coordination Exercise (FSCEX) and Mobile Assault Course (MAC) BEARMAT will retain overall control of the RTAA. Clearance to go to numbered ranges and Range/Training Areas (RTAs) or requests to conduct live fire operations shall be obtained from BEARMAT prior to commencing operations. The Combat Center R-2501 airspace control procedures are presented below. Prior to the implementation of these procedures, the DASC shall establish positive two-way communications with BEARMAT on UHF 323.5 and VHF 49.85. The DASC must have also established communications with the GCE RSO on the Regimental Safety Frequency prior to any aircraft being handed off to the DASC.

2. Pre-FINEX Control Procedures

a. Passing Control. For all Pre-FINEX training, the DASC shall be operational from one hour prior to and until one hour after daily ASCEX, FSCEX, and MAC flight operations as established by the Air Tasking Order (ATO). One hour prior to first flight, control of the R-2501 North, South, West, and East (if requested and applicable) shall be passed to the DASC. BEARMAT will retain control of the R-2501 East unless it is requested and scheduled by the ACE. All aircraft shall RIO with BEARMAT prior to takeoff if originating from the SELF or before entry into R-2501 if originating from off base on 323.5 for a Range Safety Brief and to provide Mode III squawk. After launch, aircraft in support of Pre-FINEX training shall contact the DASC on a pre-assigned frequency for clearance into the R-2501 N, S, W, required routing, and hand-off to a terminal controller. Aircraft desiring entry into the R-2501 East or Bristol MOA will contact BEARMAT for clearance. When aircraft are mission complete they will check out with the DASC for further instruction which may include:

(1) Aircraft returning to the SELF will be provided routing and be directed to contact Palms Tower on 321.8 at the five nautical mile radius of the SELF.

(2) Aircraft departing the R-2501 to any destination (to include LZ-1 and LZ-10) will be directed to contact BEARMAT on 323.5 for clearance or exit.

b. During the periods of Pre-FINEX training when no flights are scheduled or when the DASC is not operational, aircraft shall RIO with BEARMAT for range safety information and routing as required.

c. BEARMAT will always retain control of the Bristol MOA. If the R-2501 East is not scheduled, BEARMAT will retain control. The R-2501 East includes the following RTAs: Lead Mountain, Bullion, America Mine, LAVA, and Cleghorn Pass. Aircraft desiring entry/exit will contact BEARMAT on 323.5.

d. The Combat Center MEDEVAC AIRCRAFT shall remain under the positive control of BEARMAT but will be passed to the DASC for routing into the airspace that is DASC controlled. The DASC will hand-off the aircraft to BEARMAT as soon as possible for

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routing to LZ-16 (Naval Hospital), LZ-10 (MEDEVAC Standby Pad), or LZ-1 (Mass Casualties). Whenever possible MEDEVAC request will be made on VHF 49.85. BEARMAT and DASC/requesting unit will provide MEDEVAC information as required.

f. The DASC shall pass control of the R-2501 N, S, E, and W back to BEARMAT when all flight operations supporting Pre-FINEX training are back on the deck at the SELF. Essential helo operations and on going logistics missions may still continue, but will be controlled by BEARMAT.

g. The passing of control will be conducted as rapidly as possible. BEARMAT will make the final determination for the passing of control. Details concerning the passage of control will be discussed at the airspace coordination briefing. Some of the information needed will be UHF frequencies, flight turnover procedures, and friendly unit information.

2. Pre-FINEX Responsibilities:

a. BEARMAT

(1) Provide the DASC with the location of all surface training to include live-fire and non-live maneuver in the R-2501.

(2) Provide the DASC with any change in a unit's status.

(3) Provide the DASC a heads up call prior to passing them Non-CAX aircraft.

(4) Maintain control of the R-2501 East if it is not scheduled by the CAX forces.

(5) Maintain control of the Bristol MOA at all times.

(6) Maintain control of the Combat Center MEDEVAC AIRCRAFT (routing for pick-up will be provided by the DASC while they have control of the R-2501 N, S, and W).

(7) Assume Control of the R-2501 N, S, and W airspace from the DASC when violations of this manual occur (such as overflight of impact areas, lost communications, or emergencies).

b. DASC

(1) Accept control of the R-2501 N, W and S airspace from BEARMAT when operational during Pre-FINEX training.

(2) Provide BEARMAT information concerning all aircraft operating in the R-2501 airspace.

(3) Inform BEARMAT when aircraft are mission complete.

(4) Provide BEARMAT with the location of all reported duds.

(5) Provide BEARMAT with all MEDEVAC information received in order to expedite pick-up and delivery of the casualty to the center hospital.

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(6) Pass the MEDEVAC helo back over to BEARMAT as soon as safety permits for routing into LZ-16 or LZ-10.

(7) Relinquish control of the R-2501 airspace to BEARMAT upon demand.

(8) Maintain positive two-way communications with BEARMAT during all hours of operations. Lost communications for a period greater than sixty minutes will constitute a violation of this Manual and BEARMAT will assume control of the R-2501 airspace. If BEARMAT cannot contact the DASC within 30 minutes of initial attempt they will take control of the R-2501 airspace.

(9) Deliver a copy of all TAD and HD logs to BEARMAT at the end of the CAX. Make sure all logs are complete. This information is needed for reporting airspace utilization.

(10) Ensure that helos do not land at Mainside without BEARMAT's prior knowledge and approval.

(11) The only jettison area aboard the Combat Center is the Sunshine Peak RTA. This area is not to be used as a pre-planned drop area; another RTA must be scheduled for this use. Any aircraft delivering ordnance without a terminal ground controller must do a low-level cold I.D. pass prior to delivering ordnance in Sunshine Peak RTA.

(12) The following are permanent flight restrictions aboard the Combat Center:

(a) R/W 500ft and above at Mainside.

(b) F/W 1,000ft and above at Mainside

(c) 500ft and above at the Center Magazine Area (CMA) for all aircraft.

(d) All aircraft exiting the Combat Center's RTAA must maintain 1,000ft or higher over civilian areas.

c. ACE/Air Officer

(1) Deliver a copy of the Air Tasking Order (ATO) to BEARMAT not later than 0300L on the DAY of the scheduled operations. This can be left at Range Scheduling, the MCAGCC Command Duty Officer, or faxed to BEARMAT at Ext. 4619.

(2) Ensure appropriate RIO procedures and routing information are contained in the ATO. Normally the procedures are contact BEARMAT in chocks----Tower Ground ----TACC airborne----DASC for routing----Terminal control----DASC routing ----BEARMAT----Tower for landing.

(3) Ensure that all aircraft know that the R-2501 airspace does not follow the same boundary line as the ground areas in some places. All aircraft will deliver ordnance no less than 1,000 meters inside the MCAGCC GROUND TRAINING AREA BOUNDARIES.

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NOTE: THE DASC, WHEN OPERATIONAL, HAS THE SAME RESPONSIBILITIES AS BEARMAT FOR THE MANAGEMENT AND SAFE UTILIZATION OF THE R-2501 AIRSPACE OR THE PORTIONS OF WHICH THEY ARE CONTROLLING. THE DASC WILL BE GOVERNED IN ITS TASK BY EXISTING FMFMs, THIS ORDER, AND THEIR UNIT SOP.

d. Aircraft

(1) RIO with BEARMAT in the chocks for Range Safety brief and Mode III Squawk.

(2) RIO with DASC after launch if supporting Pre-FINEX training or performing other flight training in the R-2501.

(3) RIO with BEARMAT after launch if scheduled for:

(a) Any airspace the DASC is not controlling.

(b) Bristol MOA.

(c) Exiting the R-2501 airspace.

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CAX PRE-FINEX PASSAGE OF AIRSPACE CONTROL CHECKLIST

1. At a date to be determined at the Airspace Coordination Meeting, BEARMAT shall turn over control of a portion of the R-2501 to the exercise force Direct Air Support Center (DASC); BEARMAT shall continue to retain control of the ground exercise area. One hour prior to the first flight, responsibility for the control of the Restricted Airspace R-2501 shall be passed from BEARMAT to the DASC. To ensure that the turnover of control is conducted correctly and expeditiously, the following sequential checklist of events will be utilized by BEARMAT, the DASC and the Ground Combat Element (GCE) higher headquarters (HHQ). BEARMAT shall be the final authority for determining the status of each item on the checklist. Under BEARMAT's direction, all three elements will check off and record the time each item is completed.
2. All live fire and ground training units will be scheduled through the Exercise Coordinator and Range Scheduling. No Range/Training Area (RTA) will be utilized for any purpose unless the unit appears on the Range Facility Management Support System (RFMSS) daily schedule. The HHQ will ensure that all units adhere to this manual (CCO 3500.4_). The ACE will schedule all airspace and ground use through the Exercise Coordinator. No airspace above 26,000 feet will be scheduled without approval of the Range Management Officer in order to meet FAA peak operating hours.
3. MEDEVAC procedures for the DASC will be per paragraph 3006.

CHECKLIST FOR DASC ACCEPTING CONTROL FROM BEARMAT

- _____ 1. The DASC will establish communications with the BEARMAT on primary 323.5 UHF and secondary 49.85 VHF one hour prior to the first flight. The DASC will also establish communications with the RSO at this time.
- _____ 2. The RSO must establish communications with BEARMAT one hour prior to the first flight.
- _____ 3. The RSO has provided all supporting subordinate unit locations to BEARMAT and the DASC.
- _____ 4. BEARMAT has passed the status of all airborne aircraft under BEARMAT control to the DASC.
- _____ 5. BEARMAT has passed all hot ranges with altitude restrictions to the DASC.
- _____ 6. The DASC has requested to assume control of the R-2501 from BEARMAT.
- _____ 7. BEARMAT has switched all aircraft to the DASC on the proper TATC frequencies. The DASC has informed BEARMAT that they have communications with all aircraft.
- _____ 8. BEARMAT passes to the DASC, "DASC CALLSIGN, you now have control of the R-2501 North, South, East, and West (as applicable) at LOCAL TIME."
- _____ 9. The DASC passes to BEARMAT, "BEARMAT, DASC CALLSIGN has assumed control of the R-2501 North, South, East, and West (as applicable) at LOCAL TIME."

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CHECKLIST FOR DASC RETURNING CONTROL TO BEARMAT

- _____ 1. The DASC has informed BEARMAT that they are ready to return control of the R-2501 to BEARMAT. All fixed-wing aircraft are on the deck or have exited the R-2501 before BEARMAT will take control.
- _____ 2. HHQ has passed all unit locations to BEARMAT.
- _____ 3. The DASC has informed BEARMAT of the status of all aircraft and switched all airborne aircraft to 323.5.
- _____ 4. BEARMAT has informed the DASC that it has communications with all aircraft.
- _____ 5. BEARMAT has informed the DASC that they are ready to accept control of the R-2501.
- _____ 6. The DASC passes to BEARMAT, "BEARMAT, you now have control of the R-2501 North, South, East, and West (as applicable) at LOCAL TIME."
- _____ 7. BEARMAT passes to the DASC, "DASC CALLSIGN, BEARMAT has assumed control of the R-2501 North, South, East, and West (as applicable) at LOCAL TIME."

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CAX FINEX PASSAGE OF AIRSPACE CONTROL CHECKLIST

1. At a date to be determined, BEARMAT shall turn over control of the R-2501 to the Command Element RSO and the exercise force Direct Air Support Center (DASC). To ensure that the turnover of control is conducted correctly and expeditiously, the following sequential checklist will be utilized by the Ground Combat Element (GCE), the DASC and BEARMAT. Units must understand that upon accepting control of the RTAA, they are responsible for all activity within their area of responsibility, whether or not it is involved with their exercise. Under BEARMAT's direction, all three elements will check off and record the time of each item completed.
2. MEDEVAC procedures for the DASC will be per paragraph 3006.

CHECKLIST FOR DASC ACCEPTING CONTROL FROM BEARMAT

1. Communications Established. On the day prior to assuming control, the DASC has established communications with BEARMAT on 323.5 UHF and 49.85 VHF. The DASC has also established communications with the CAX RSO on the Regimental Safety Net. The CAX RSO must establish communications with BEARMAT on 49.85 one day prior to assuming control.
2. Roadguards Posted. The CAX RSO has ensured that access to areas to be controlled is restricted. Roadguards have been will be posted in pairs at checkpoints with VHF radio equipment. Roadguards have the GCE frequencies as well as BEARMAT's. Roadguards must be posted prior to any unit going to the field for CAX.
3. Communications with Subordinate Commands. The CAX RSO has established communications with all subordinate units in the exercise area and has confirmed with BEARMAT the location of all units in the exercise area. The GCE has attempted to ensure that there are no units in the field prior to accepting control.
4. Range Sweep. A range sweep of the exercise area has been initiated. Any person, equipment or units in the field must be identified and reported. This shall be done prior to any unit going to the field; recon teams and retrans personnel are exceptions. The aircraft conducting the sweep must contact BEARMAT on 323.5 and remain on that net (or 49.85) for the duration of the sweep.
5. Position Update. As the range sweep is being conducted, BEARMAT passes the location of all hot ranges and the positions of all aircraft and unit locations to the DASC.
6. Aircraft Hand-Off. The Range Sweep is complete. The DASC has established communications with all aircraft within the R-2501 and informed the CAX RSO and BEARMAT when accomplished.
7. Ready to Accept Control. The DASC will notify the GCE that they are ready to assume control of R-2501.

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8. Passing Control. BEARMAT has passed control by transmitting to the CAX RSO, "GCE CALLSIGN, you now have control of the exercise area and through DASC CALLSIGN the R-2501 airspace."

9. Accepting Control. The GCE has accepted control by transmitting to BEARMAT, "BEARMAT, GCE CALLSIGN now has control of the exercise area and through DASC CALLSIGN the R-2501 airspace".

NOTE:

1. Non Exercise Aircraft. During the period that the DASC has control, BEARMAT will notify the DASC of any aircraft requesting to use or transit the R-2501.

2. Scheduling. All requests for use of any RTA outside the exercise area will be coordinated through the Exercise Coordinator.

3. Communications. The CAX RSO and the DASC will ensure that communications are maintained with BEARMAT on 49.85 VHF or 323.5 UHF at all times, and that hourly radio checks are conducted. The GCE will establish retrans sites to ensure that communications with BEARMAT are maintained. If communications between BEARMAT and the DASC and/or BEARMAT and the CAX RSO are lost, the exercise force is required to go into an immediate cease fire status until communications links are restored. These radio nets must be monitored at all times. If BEARMAT cannot contact the DASC or the CAX RSO within 30 minutes, the exercise force will be put into an immediate cease fire status by BEARMAT.

4. Medevac Procedures. Whenever an actual MEDEVAC situation occurs and the MEDEVAC helicopter is en route (or another aircraft is diverted by the DASC), all live fire aboard the Combat Center will immediately cease (except for Ranges 100 through 108). While the DASC has control of the R-2501, the GCE or a subordinate command may request MEDEVAC support directly from the DASC without notifying BEARMAT; the DASC will notify BEARMAT as the situation allows. However, all essential information must be passed to BEARMAT as soon as possible in order to allow for the notification of the Naval Hospital, Fire Department, and PMO. BEARMAT will hand-over control of the MEDEVAC helicopter to allow for routing into and out of the field; the DASC will provide initial routing of the MEDEVAC helicopter directly to LZ-16. The DASC will then hand-over the MEDEVAC helicopter to BEARMAT as soon as safety of the flight permits. The DASC and/or GCE will ensure that BEARMAT is kept up to date on the status of any pending MEDEVACs. The DASC may, at their discretion, divert an available aircraft in order to respond to a MEDEVAC request, however the DASC must notify BEARMAT promptly that the dedicated MEDEVAC helicopter is not needed. Occasionally, it is necessary for the MEDEVAC helicopter to transport a patient to a facility off-Center. If this occurs, the DASC must immediately place the Combat Center in a cease fire status until the MEDEVAC helicopter returns to the R-2501 airspace or the ACE identifies another aircraft as a dedicated MEDEVAC helicopter.

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CHECKLIST FOR DASC RETURNING CONTROL TO BEARMAT

- _____ 1. ENDEX. The CAX RSO has informed BEARMAT that ENDEX (the end of the evaluated portion of the CAX) has been sounded.
- _____ 2. Cease Fire. The CAX RSO has informed BEARMAT that all live fire (both ground and air munitions) has ceased, that a cease fire has occurred, and that all weapons have been checked clear and safe of all munitions. No unit participating in the CAX may lift the cease fire and expend excess munitions without permission from the CAX RSO. The CAX RSO shall notify BEARMAT of any live fire changes.
- _____ 3. Aircraft Operations. The DASC has ensured that all fixed-wing and nonessential rotary-wing operations have secured. Once ENDEX has been announced, no fixed-wing or nonessential rotary-wing operations are authorized until BEARMAT has accepted control of the RTAA. BEARMAT may accept control of the R-2501 independently from the ground RTA's to accommodate non-CAX training evolutions while CAX forces are returning from the field. BEARMAT may also take control of the R-2501 while some essential helicopter operations (i.e., retrans/STAY Team recoveries) are underway. BEARMAT will not accept responsibility for any personnel being extracted or for the accountability of personnel remaining in the field.
- _____ 4. Movement of Marines. The CAX RSO has expedited movement of Marines and equipment from the exercise area to the Exercise Support Base (ESB, Camp Wilson). An accurate account of all units, equipment, and personnel has been made.
- _____ 5. Range Sweep. The exercise area has been cleared of all units and flight operations have been secured. The GCE has performed a range sweep to visually clear the exercise area. NOTE: THE RANGE SWEEP WILL NOT BE CONDUCTED DURING TROOP MOVEMENT TO THE ESB, BUT RATHER AFTER ALL PERSONNEL HAVE RETURNED AND ARE ACCOUNTED FOR. THE SWEEP WILL NOT BE CONDUCTED DURING THE HOURS OF DARKNESS.
- _____ 6. Air Check. The range sweep has been completed. The CAX RSO has asked the DASC if the R-2501 airspace is clear of all aircraft. If not, the DASC will pass all aircraft that are airborne to BEARMAT for control. When completed, all aircraft will switch to BEARMAT on 323.5 for control.
- _____ 7. Returning Control. The range sweep has been completed, the exercise area and R-2501 have been cleared, and essential ops have been identified. The GCE shall inform BEARMAT that it is ready to return control to BEARMAT.
- _____ 8. Acknowledgment. BEARMAT has received confirmation from the GCE that all units have returned to the ESB or SELF, or the status of any essential helicopter ops. The GCE has passed control by transmitting to BEARMAT, "BEARMAT, you now have control of the exercise area and the R-2501 airspace."
- _____ 9. BEARMAT has Control. BEARMAT has accepted control by transmitting to the GCE, "GCE CALLSIGN, BEARMAT now has control of the exercise area and the R-2501 airspace."

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LARGE SCALE EXERCISE PASSAGE OF AIRSPACE CONTROL CHECKLIST

1. On a time TBD, control of the RTA's within the exercise area shall be passed from BEARMAT to the Command Element RSO. To ensure that turnover of control is conducted correctly and expeditiously, the following sequential checklist will be utilized by the Ground Control Element and BEARMAT. Units must understand that upon accepting control, they are responsible for all activity within their area of responsibility whether or not it is involved with the actual exercise.

CHECKLIST FOR DASC ACCEPTING CONTROL FROM BEARMAT

_____ 1. Communications Established. On the morning prior to accepting control, the RSO has established and maintained communications with BEARMAT on 49.85 VHF. Additionally, the DASC and RSO have established communications with each other.

_____ 2. Roadguards Posted. The RSO has ensured that access to areas to be controlled is restricted. Roadguards have been posted in pairs at checkpoints with VHF radio equipment. Roadguards have RSO and BEARMAT frequencies.

_____ 3. Communications with Units. Prior to accepting control, the RSO has established comm with all subordinate units in the exercise area and confirmed with BEARMAT the location of all units.

_____ 4. Range Sweep Initiated. At a time prior to accepting control, a range sweep of the designated exercise area will be conducted. Any person, unit, or equipment in the field has been identified and reported. Recon teams and retrans personnel are exceptions. The aircraft conducting the range sweep will contact BEARMAT on primary 323.5 or secondary 49.85 and remain on that net for the duration of the sweep.

_____ 5. Range Sweep Complete. Completion of the range sweep and confirmation that all prerequisites have been met. RSO has notified BEARMAT it is ready to assume control of the applicable portions of the R-2501.

_____ 6. Release of Scheduled Ground to GCE. BEARMAT has passed control of scheduled areas to exercise force by transmitting, "GCE CALLSIGN, you now have control of the assigned exercise area and scheduled areas of the R-2501." BEARMAT will retain control of all numbered ranges and RTA's not scheduled by the exercise force.

_____ 7. Acceptance of Ground Assigned Areas. The RSO has accepted control of scheduled areas by transmitting to BEARMAT, "BEARMAT, GCE CALLSIGN now has control of the assigned exercise area and scheduled areas of the R-2501."

_____ 8. RSO has Read and Accepts Responsibilities. The RSO is responsible for:

a. Providing all unit positions, unit firing points and impact areas.

b. Providing BEARMAT and Range Scheduling (via the Exercise Coordinator) with any changes to unit locations and firing points and impacts.

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c. Notifying BEARMAT and Range Scheduling (via Exercise Coordinator) of all MLRS firing positions, impact areas and altitudes at least 24 hours prior to conducting MLRS live fire. No MLRS live fire is to be conducted above 26K without prior coordination and permission of the Director, Operations and Training.

_____ 9. Position Update. As the range sweep is being conducted, BEARMAT passes the location of all hot ranges and the positions of all aircraft and unit locations to the DASC.

_____ 10. Aircraft Hand-off. The range sweep is complete. The DASC has established communications with all aircraft within the R-2501 and informed the Exercise Force RSO and BEARMAT when accomplished.

_____ 11. Ready to Accept Control. The DASC will notify the GCE that they are ready to assume control of R-2501.

NOTE: (1) REQUESTS FOR USAGE OF ANY RTA OUTSIDE OF THE DESIGNATED EXERCISE AREA WILL BE COORDINATED WITH RANGE SCHEDULING VIA THE EXERCISE COORDINATOR.

(2) THE DSO AND DASC WILL ENSURE THAT COMMUNICATIONS ARE MAINTAINED WITH BEARMAT ON 49.85 OR 323.5 AND THAT HOURLY RADIO CHECKS ARE CONDUCTED. RETRANS SITES MAY BE ESTABLISHED TO ENSURE COMMUNICATIONS WITH BEARMAT. IF COMMUNICATIONS BETWEEN EITHER THE DASC, RSO, OR RSO SUBORDINATE UNITS ARE LOST, THE EXERCISE FORCE IS REQUIRED TO CEASE FIRE UNTIL COMMUNICATIONS ARE RE-ESTABLISHED.

CHECKLIST FOR DASC RETURNING CONTROL TO BEARMAT

_____ 1. ENDEX. RSO has informed BEARMAT that ENDEX has occurred.

_____ 2. Cease Fire has Occurred. The RSO has ensured that all live fire has ceased and has informed BEARMAT. No unit shall lift the cease fire and expend excess munitions without authorization from the RSO. BEARMAT has been informed of any live fire changes.

_____ 3. Aircraft Operations. The DASC has ensured that all fixed-wing and non-essential rotary-wing operations have secured. Once ENDEX has been announced, no fixed-wing or non-essential rotary-wing operations are authorized until BEARMAT has accepted control of the RTAA. BEARMAT may accept control of the R-2501 independently from the ground RTA's to accommodate non-CAX training evolutions while CAX forces are returning from the field. BEARMAT MAY also take control of the R-2501 while some essential helicopter operations (i.e.. retrans/STA Team recoveries) are underway. BEARMAT WILL NOT accept responsibility for any personnel being extracted or for the accountability of personnel remaining in the field.

_____ 4. Movement Back to Rear. The RSO is expediting movement of troops and equipment from the exercise area to the Exercise Support Base (ESB, Camp Wilson). An accurate account of all units, equipment, and personnel is being made. All unit RSO's are ensuring that all weapons systems are cleared prior to movement back to the ESB, Camp Wilson).

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_____ 5. Range Sweep in Effect. The exercise area is clear of all units and all nonessential flight operations are secured. All units are back at the ESB and accounted for. The range sweep must take place during daylight hours.

_____ 6. Range Sweep Complete. The Range sweep is complete. The scheduled exercise area is clear except for essential operations which have been identified to BEARMAT via the DASC and RSO.

_____ 7. RSO Initial Notification to Return Ground Control. RSO notified BEARMAT that RSO is ready to return control of the ground area.

_____ 8. RSO has Returned Ground Control to BEARMAT. BEARMAT has received confirmation that all units have returned to the ESB and SELF, and has also received the status of all essential helo ops. RSO has transmitted, "BEARMAT, you now have control of the assigned exercise area and the R-2501 airspace."

_____ 9. Transfer of Control. BEARMAT has accepted control by transmitting to the GCE, "GCE CALLSIGN", BEARMAT now has control of the assigned exercise area and the R-2501."

_____ 10. Acceptance of Control. BEARMAT has accepted control of scheduled areas by transmitting to GCE, "GCE CALLSIGN", BEARMAT now has control of the assigned exercise area and the R-2501."

NOTE: ONCE BEARMAT HAS ASSUMED CONTROL, ALL TRAINING MUST BE SCHEDULED DIRECTLY THROUGH RANGE SCHEDULING.

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APPENDIX K

STRATEGIC EXPEDITIONARY LANDING FIELD (SELF) OPERATIONS

1. SELF. Operations shall be conducted per 3d Marine Aircraft Wing (MAW) Order (WgO) 3700.1. A special Letter of Agreement (LOA) has been established between CG, MCAGCC and CG, 3d MAW to promote safety of flight and define the coordination required to control live firing weapons and other projectile hazards to aircraft flights arriving and departing the SELF, MCAGCC, Twentynine Palms, CA.

a. SELF Class "D" Surface Area (CDSA). Defined as that airspace extending from the surface up to and including 4,600 feet MSL within a 4.3 nautical mile radius of the MCAGCC SELF; and that airspace extending upward from the surface within 1.8 miles each side of the Twentynine Palms VORTAC 298 degree radial, extending from the 4.3 mile radius to 13.9 miles west of the VORTAC. This CDSA is under the control of the SELF Palms Tower whenever the SELF is operational. When the SELF is closed, the airspace and ground area are under the control of BEARMAT.

b. Special Instructions. Several training ranges, Range 101 through Range 107, are located within the five mile ARC of SELF control zone. Status of those ranges will be passed by BEARMAT to SELF operations and all aircrews operating in the R-2501. Range 103 has some unique features and poses additional hazards to aircraft safety that require in-depth coordination.

(1) Mortars (illumination only) are authorized on Range 103. When illumination is employed, aircraft NVG operations near the SELF must cease. Prior coordination between Range Scheduling, BEARMAT, SELF Ops, and the using unit is required. Coordination between BEARMAT and Palms Tower will be on UHF 323.5. Coordination between BEARMAT and Range 103 will be on VHF 49.85 or telephone.

(2) Wind limits for mortar illumination shall be per unit SOPs.

(3) 60mm mortars should be located on the right flank of the range for night firing if illumination is used.

(4) Units may use individual night vision devices at discretion of OIC/RSO.

(5) Each unit is required and responsible to establish and maintain effective communication to control all firing aspects.

(6) No aircraft operating with Night Vision Goggles (NVGs) will be in the SELF pattern at the same time illumination is being employed on Range 103. Coordination for check-fire between SELF, BEARMAT, using unit, and the mission aircraft is required.

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APPENDIX L

LOW ALTITUDE TACTICS (LAT) AND TERRAIN FOLLOWING (TERF) ROUTES

1. General. The following contains the fixed wing Low Altitude Tactics (LAT) and rotary wing Terrain Following (TERF) routes within the MCAGCC/R2501 range complex.

2. Fixed Wing Low Altitude Tactics (LAT) route. The following is the 3d MAW approved LAT course.

	LAT/LONG	
A.	34 20 11N, 116 19 40W	
B.	34 31 11N, 116 23 15W	
C.	34 35 24N, 116 22 41W	
D.	34 38 32N, 116 21 06W	
E.	34 38 04N, 116 15 40W	
F.	34 33 12N, 116 07 40W	MAC AUTHORIZED BETWEEN PTs F and G
G.	34 29 35N, 115 55 21W	
H.	34 24 37N, 115 49 52W	
I.	34 19 08N, 115 53 24W	
J.	34 23 53N, 115 58 22W	
K.	34 25 07N, 116 03 03W	
L.	34 26 15N, 116 10 45W	

3. Rotary Wing Terrain Following (TERF) routes. The following are the only authorized TERF routes within the MCAGCC/R-2501 range complex.

ROUTE	GRID	DESCRIPTION	RTA
RED	NU 523 318		Sunshine Peak
	NU 544 388	Base of Lava	Sunshine Peak
	NU 579 372	Mine Shaft	Lavic Lake
	NU 638 379	Hill 2070	Lavic Lake
	NU 648 388	Stream Intersection	Lavic Lake
	NU 707 348	Hill 2830	Lavic Lake
	NU 664 337	Hill 2495	Lavic Lake
NOTE: There is potential conflict between TERF route RED and the Sunshine Peak hung ordnance area. Range Scheduling will de-conflict use prior to scheduling TERF route RED.			
BLUE	NU 737 177	Saddle	Rainbow Canyon
	NU 710 207	Hill 3583	Rainbow Canyon
	NU 685 226	Valley	Rainbow Canyon
	NU 688 290	Hill	Rainbow Canyon
	NU 734 261	Road intersection	Rainbow Canyon
	NU 738 191	Hill 3377	Rainbow Canyon
Green	NU 739 134	Hill 2882	Noble Pass
	NU 754 107	Stream intersection	Noble Pass
	NU 792 148	Hill 3443	Noble Pass
	NU 757 190	Hill 3688	Noble Pass
	NU 781 201	Hill	Noble Pass
	NU 783 234	Hill	Noble Pass

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ROUTE	GRID	DESCRIPTION	RTA
YELLOW	NU 939 062	Hill 2224	Lava
	NU 912 068	Saddle	Lava
	NU 875 104	Saddle	Lava
	NU 852 146	Hill 2719	Lava
	NU 908 160	Hill	Lava
	NU 980 120	Hill 1909	Lava
AMBER	NT 887 930	Hill	Delta
	NU 849 012	Hill 3448	Delta
	NU 829 062	Hill	Delta
	NU 859 117	Valley	Delta
	NT 924 977	Hill 3180	Delta
	NT 905 966	East Prospect	Delta
ORANGE	NU 597 085		Emerson Lake
	NU 546 163		Maumee Mine
	NU 490 262		
	NU 559 222		
	NU 592 169		
	NU 619 087		

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APPENDIX M

INDIRECT FIRE WEAPONS PROCEDURES

1. GENERAL. This appendix contains firing procedures for indirect fire weapons aboard MCAGCC and provisions for waivers of Marine Corps Orders that may be authorized by the Director, Operations and Training. The CAX Safety Handout, published by TTECG, contains waivers authorized during TTECG CAX events only.

a. The Commanding Officer of the firing unit is ultimately responsible for determining the level of training of his unit and that all additional safety concerns contained in this appendix have been addressed.

b. The Commanding Officer will ensure that all safety personnel have been properly certified and a copy of that certification has been sent to the Director, Operations and Training, MCAGCC.

c. The Commanding Officer will ensure that the Range Management Officer has been notified through Range Scheduling that the unit will be conducting live fire under the provisions of this appendix.

2. FIRING PROCEDURES

a. Positions. Survey of battery positions, radar positions, observer positions, HB/MPI positions, and registration points will be accomplished by the methods prescribed in FM 6-20-1 and FM 6-50.

b. Weapons

(1) All weapons will have undergone required fire control alignment tests within the intervals indicated in applicable technical and field manuals prior to deployment to the field.

(2) Cannon tube serviceability (within the acceptable limit of wear as per the reference) will be within standards established by TM 1000-202-14.

(3) Only ammunition authorized for overhead fire will be used when maneuver forces are involved in the exercise.

c. Corrections for Non-Standard Conditions

(1) Weapons firing from a position surveyed (to include directional control) to an accuracy of 1/1000 (5th order) may fire with a GFT setting obtained by the MET plus VE method. Two observed check rounds must be fired by the firing unit prior to general firing if overhead fire is to be conducted and no registration has occurred.

(2) Weapons firing from a position located by hasty survey may fire with a GFT setting obtained by the MET plus VE method IF THE BATTERY COMMANDER HAS ABSOLUTE CONFIDENCE IN HIS LOCATION. Before commencing general firing, two observed check rounds must be fired by the firing unit if overhead fire is to be conducted.

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If the Battery Commander lacks confidence in the unit location after the firing, he will conduct a registration.

3. REGISTRATION: The following types of registration are authorized at MCAGCC:

- a. High Burst -- radar
- b. High Burst -- Observer
- c. Precision (Impact and Time)
- d. Mean point of impact

4. OVERHEAD FIRE.

- a. Protected troops.

(1) Light field artillery fire, up to and including 105mm howitzer, may impact no closer than 100 meters to occupied bunkers. Medium and heavy field artillery fire, above 105mm, may impact no closer than 200 meters to occupied bunkers. In order to protect personnel from a direct hit by the ammunition being fired, bunkers must be inspected and approved by the MCAGCC Safety Office prior to use. Ammunition certified for overhead fire must be used. Constant communication must be maintained between the firing position and bunkers. Observation from bunkers will be by indirect viewing such as periscopes unless an approved design for direct viewing has been provided.

(2) Tanks and armored personnel carriers with hatches closed are authorized into Area C of the SDZ, when field artillery ammunitions is fired overhead with VT or T fuzes. Height of burst data in Table 11-2 of reference (a) will be used to provide an adequate degree of safety to protect personnel and materiel from ammunition fired with VT or T fuzes. The following procedures apply when firing over tanks and armored vehicles:

(a) Increase the height of burst by a minimum of four PER (probable error range) when computing firing data.

(b) Do not use weapon systems of caliber's greater than 155mm.

(c) Use sufficient quadrant elevation so that if the time element of the fuze fails to function, the projectile will land beyond the tank or armored vehicle at a distance equal to predicted height of burst plus four PER.

- b. Unprotected troops

(1) Only ammunition certified for overhead fire (projectiles, propellant, and fuzes) will be fired overhead of unprotected troops. Mortar ammunition is not cleared for overhead fire; therefore, overhead fire of unprotected troops is PROHIBITED.

(2) Projectile trajectories must clear unprotected personnel or objects by at least five (5) meters plus two forks. If the minimum range line (arc)

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is greater than the distance to the near edge of the target area, use the computed minimum range line (arc) for the near edge of the target area.

(3) Only Charge 3 green bag or higher will be used for overhead fire.

(4) Unless personnel are provided cover designed to withstand a direct hit, the minimum arming time of the proximity (VT) fuze establishes the near edge of the impact area. The minimum arming time of the proximity (VT) fuze will be the time set on the fuze corresponding to the range to the near limit of the impact area or computed minimum range line, whichever is greater, plus 5.5 seconds.

5. ROCKET ASSISTED PROJECTILES (RAP). Rocket assisted projectiles will not be fired over the heads of unprotected troops. Rocket-on firings require 6,000 meters clear zone short of the target area in case the rocket motor fails to function. Rocket-off firings require 6,000 meters clear zone beyond the target area to allow for accidental (unintended) initiation of the rocket motor. For quadrant elevations greater than 950 mils, 8,000 meters is required short of the target area and 8,000 meters beyond the target area for rocket-on and rocket-off modes.

6. CANNON LAUNCHED GUIDED PROJECTILE (COPPERHEAD):

a. Firing conditions.

(1) Fire Support Team (FIST) personnel located in the Mission Essential Area (MEA) will wear approved flak jackets and protective helmets.

(2) FIST personnel are not authorized to occupy the SDZ when Copperhead is fired in the ballistic mode.

(3) Laser designators used with Copperhead will be operated in accordance with safety guidelines in MIL-HDBK-828 and Appendix G.

(4) Specific safety procedures and firing computations for Copperhead are found in TC 6-30-1

b. Surface danger zone (SDZ).

(1) Special SDZ construction requirements for M712 are given in figure M-1.

(2) The MEA must start at least 1.5km in front of the target and not exceed 3.5km in length (distance equals a total of 5km from the target). The MEA must remain outside of the prohibited area of the SDZ.

(3) The Laser firing area should be determined first and then the SDZ drawn to ensure that a LASER site is within the MEA.

7. SURFACE DANGER ZONE (SDZs). In accordance with reference (a) Surface Danger Zones (SDZs) are required to determine how close the exercise force can safely maneuver to the target area, a SDZ must be established for each target area used. Commanders may use either SDZs drawn to scale or MSLs. Minimum safe limits for the maneuver forces will be designated in some positive manner (i.e., natural terrain features identifiable by everyone).

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a. Surface danger zones for field artillery need only consist of the impact and target areas. The impact area is to be designed so that no fire or the effects of that fire will impact closer than 1,000 meters from a position to be occupied by troops or a minimum safe line (MSL) which applies to that impact area. Target areas are internal to the impact area. Procedures in establishing the target area are to reduce the size of the impact area by the distances of Areas A and B of the normal SDZ and are to incorporate all probable errors to ensure that all fires or the effects of that fire do not land closer than 1,000 meters from the maneuver elements or the MSL established for the maneuver elements.

b. In the case of no-fire areas, the target area may extend to the boundary of the no-fire area provided that the no-fire area has been constructed to provide the separation distance from troops indicated above. If the no-fire area is of insufficient size to ensure this separation, the boundary of the target area may not extend any closer than the safe separation distances of the actual location of the maneuver element.

8. MINIMUM SAFE LINES (MSLs)

a. A MSL is a line on the ground that represents the closest that maneuver troops can occupy to the impact area of artillery and mortar fire. A MSL can be constructed three ways:

(1) An imaginary line connecting two or more prominent points on the ground forward of the front-most line of troops.

(2) By the use of prominent monuments or markers emplaced perpendicular to the MSRs that cross the MSL. These markers will be emplaced by the senior headquarters conducting the exercise.

(3) Using Northing and Easting Coordinates (grid lines) when the following measures are in place:

(a) The forward elements of the maneuver units have GPS capability that provides positive position location.

(b) The senior FDC/FSCC has positive control of the location of the forward elements of the maneuver force.

b. Artillery or mortar ordnance may not impact closer than 1000 meters to troops and equipment beyond this MSL. Artillery units of Battalion size and larger are authorized to use MSLs under the following provisions:

(1) That when a MSL is broken, all fires cease until the next MSL is incorporated and all elements of the maneuver force are positively located and the firing units acknowledge that the new MSL is in effect.

(2) All fires are cleared by the senior fire direction center (FDC) or fire support coordination center (FSCC).

(3) During independent combined arms training, the exercise force commander may authorize modification of the procedures in Chapter 11 of ref (a) as follows:

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(1) Surface Danger Zone Diagrams need not be drawn for every firing position.

(2) Impact and Target areas are the only portions of the SDZ that need to be identified.

(3) The Dir, O & T has been notified via the Range Operations Office prior to deploying to the field.

9. COMBAT LOADING OF VEHICLES AND TROOPS. MCO 8020.10 authorizes installation commanders to approve the transportation of live ammunition and gun crews in the same combat vehicle(s). The commanding general has approved combat loading aboard MCAGGC subject to the following:

a. Authorization is limited to live fire training areas only. Transportation of ammunition and personnel in the same vehicle(s) en route to the training area is prohibited. Transportation of personnel who are not directly assigned responsibilities that require their presence is also prohibited.

b. Where applicable, ammunition must be transported in original containers. Special attention must be given to securing separately loaded projectiles and propelling charges.

c. No smoking restrictions must be strictly enforced.

d. All other pertinent safety precautions (e.g., availability of fire extinguishers) must be reemphasized to all concerned prior to each evolution.

10. DUAL PURPOSE IMPROVED CONVENTIONAL MUNITIONS (DPICM). When authorized by the Director, Operations and Training, dual purpose improved conventional munitions (DPICM) may be fired into range 601. Requests to fire DPICM on range 601 should include the following information:

a. Type.

b. Quantity.

c. Training value.

11. MULTIPLE LAUNCH ROCKET SYSTEM (MLRS):

a. Firing Conditions.

(1) All non-mission essential personnel will be cleared from the SDZ.

(2) Meteorological data supplied to the fire control system will not be more than 4 hours old.

(3) Position Determining System (PDS) data must be verified as correct.

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(4) Fire control system internal tests must be successfully completed.

(5) Firings will not be conducted if:

(a) there is any question of proper operation of the launcher, or

(b) the winds have changed dramatically since meteorological data was taken, or

(c) the fire control panel shows that internal tests were not completed successfully,

(d) any other sign of abnormal operation is evident.

(6) The PDS data can be checked by comparing current PDS done at the launcher, or a location status message (with launcher position data) transmitted back to battery or platoon. If the launcher is laid, the launch message will also contain azimuth, quadrant elevations, and fuze set time. The verifications required above have tolerances published in MLRS TMs and FMs (FC 6-60).

(7) Safe separation distance between MLRS launchers firing simultaneously from a single point is 55 meters. This distance is based on net explosives weight for launchers containing two full rocket pods.

(8) A verified MAP SPOT is conducted.

b. Surface danger zone.

(1) SDZs for practice rockets M-28 and M-28A1 are given in Figures M-2 and M-3. TACTICAL WARHEADS ARE FOR COMBAT ONLY AND ARE NOT AUTHORIZED AT MCAGCC. Dimensions of the SDZ varies according to range to target and launcher height above mean sea level (MSL). The SDZ consists of an impact area, areas A, B, F, and exclusion areas I, II, and III forming a rectangle around the target with a corresponding flight corridor back toward the launcher.

(2) The rectangular impact area extends X meters beyond the target, a distance of area W to the left and right of the target, and 2,200 meters from the target toward the launcher (Distance Y). The construction of the SDZ is completed by connecting the rear left and right corners of the rectangle to respective points 350 meters to the left and right of the launcher. The impact area is designed to contain fragments and debris (payload, warhead skin, and rocket motor) from normal functioning rockets. Distance X is adequate to contain rockets when the fuze fails to function.

(3) Area A is an area 320 meters in width paralleling each side of the SDZ. It is considered adequate to contain fragments and debris from rockets impacting at the edge of the SDZ.

(4) Area B is an extension of the impact area and Area A to a distance of 1,300 meters beyond those areas. Area B is considered adequate to contain fragments and debris from a rocket impacting at the far edge of the impact area.

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(5) Exclusion area III is an area 1,800 meters on the uprange side of the impact area and parallel to Area B. that extends forward of the launcher. This area is designed to contain fragments and debris from early functioning warheads at the near edge of the impact area.

(6) Exclusion Area I is the 4,700 meter area that extends forward of the launcher. Personnel and equipment are endangered by premature fuze function or failure of the rocket motor during boost phase. Exclusion Area I can be reduced to not less than 1,000 meters by waiver.

(7) Exclusion area II is the remaining area located between Areas I and III once these areas are constructed. Occupation of exclusion Area II by unprotected troops is authorized only under waiver.

(8) Area F is the area immediately to the rear of the launcher directly exposed to blast over-pressure and fragments and debris from rocket launch. Area F extends 350 meters to each side of the launcher and 400 meters to the rear. Personnel are prohibited from occupying Area F during firings. A noise hazard area extends an additional 500 meters past Area F and may only be occupied by mission essential personnel wearing approved single hearing protection.

(9) The SDZ for the Reduced Range Practice Rocket (RRPR) differs in that there are no Areas A and B or exclusion Areas III. This is in effect since the RRPR does not have a warhead effect. Exclusion Area I has been reduced to 2,500 meters without a waiver.

NOTE. Waivers for the reduction of Exclusion area I for the M28 practice rocket and authorized overhead fire for unprotected troops in Exclusion area II for the M28 practice rocket is authorized by this appendix. The M28A1 (RRPR) has NOT been authorized for overhead fire of unprotected troops. Requests for waivers for overhead fire of the RRPR will contain a complete risk assessment for each mission.

(10) Tables M-1 and M-2 contain distances to construct the SDZs for MLRS rockets.

12. MORTAR FIRING PROCEDURES

a. Field firing of mortars includes the firing of the 60mm and 81mm mortars at ground targets. Safety officers/SNCOs will be assigned in accordance with paragraph 1.6.g of reference (a) and will be guided in the performance of their duties by this Manual, and Appendix B, FM 23-91. Air sentries will be posted during mortar firing. Road guards will be posted as required.

b. FIRING MORTARS OVER THE HEADS OF TROOPS IS PROHIBITED AT ALL TIMES. Troops may not enter the Surface Danger Zone (SDZ) drawn in accordance with reference (a) during live firing.

c. Mortars may be employed on the Forward Edge of the Battle Area (FEBA) during exercises at the Combat Center in order to comply with the overhead fire restrictions. Tactics will not be an issue and troop safety will prevail.

d. Mortars will either adhere to MSL restrictions (FSCC control) or use SDZ's (Figure M-4) for appropriate mortar (Direct support unit control).

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e. Safety precautions as prescribed in FMs 23-85, 23-90, 23-91, and 23-92 and in conjunction with reference (a) will be strictly followed.

f. The seriousness of accidental explosions which have occurred in training with mortar ammunition has been increased by the presence of large numbers of persons at the mortar position. To minimize the number of casualties in the event of accidental explosions during training, only the minimum number of persons required should be at the mortar position when firing. All personnel not actually engaged in firing should seek cover, i.e., washes, rock formations, low ground, trenches, etc., or be separated from the firing point by a safe distance.

g. Misfire procedures for mortars having fixed firing pins after having a failure to fire are:

1. Wait at least one (1) minute.
2. Remove the round.
3. Re-pin the round.

h. Misfire procedures for mortars having a spring or percussion-type firing pin, after the failure to fire:

- (1) Activate the firing mechanism two (2) more times.
- (2) If the mortar still fails to fire, wait one (1) more minute.
- (3) Remove the round.
- (4) Re-pin the round.

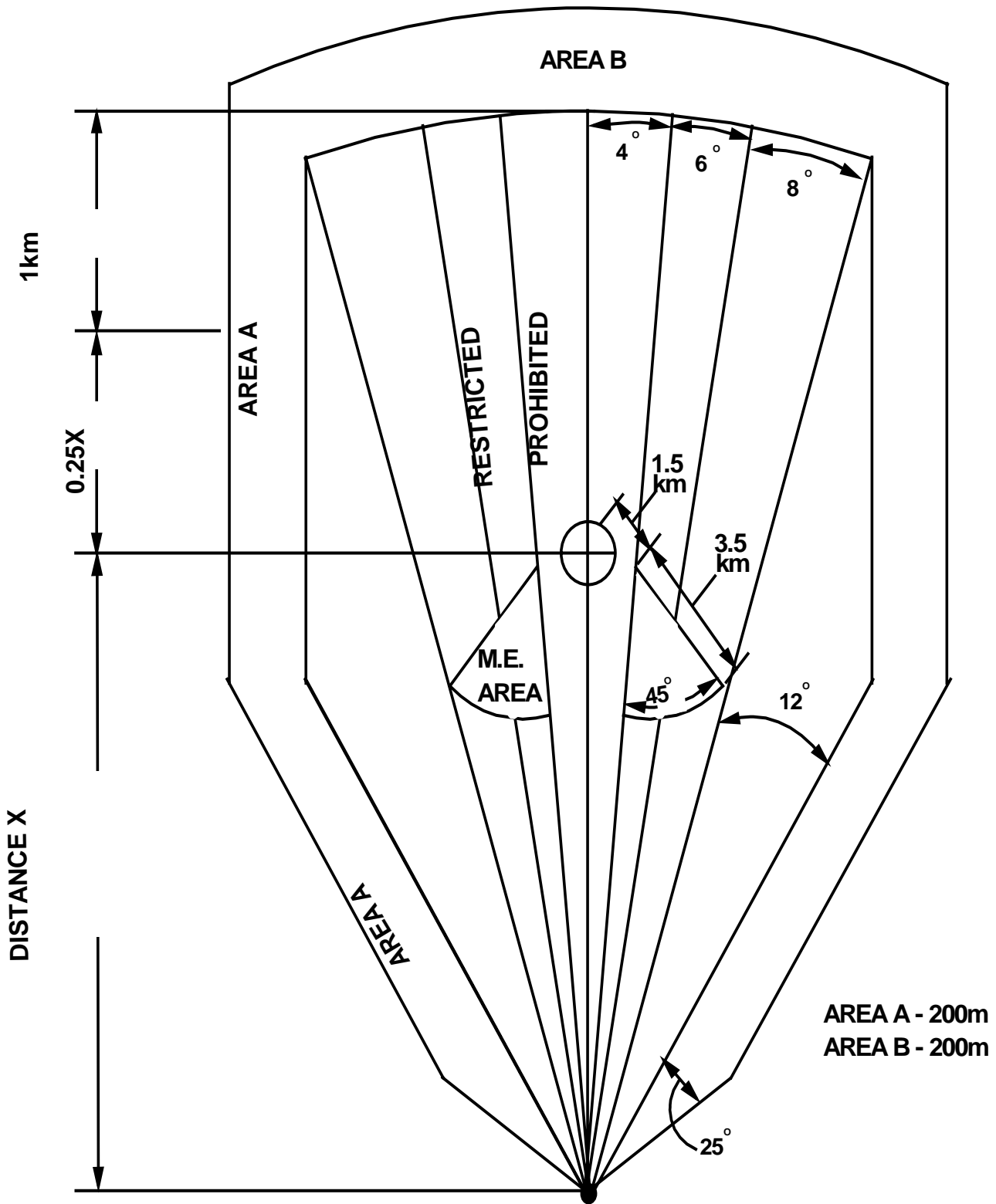


Figure M-1.--Surface Danger Zone for Copperhead , Glide Mode

SOP FOR RTAA

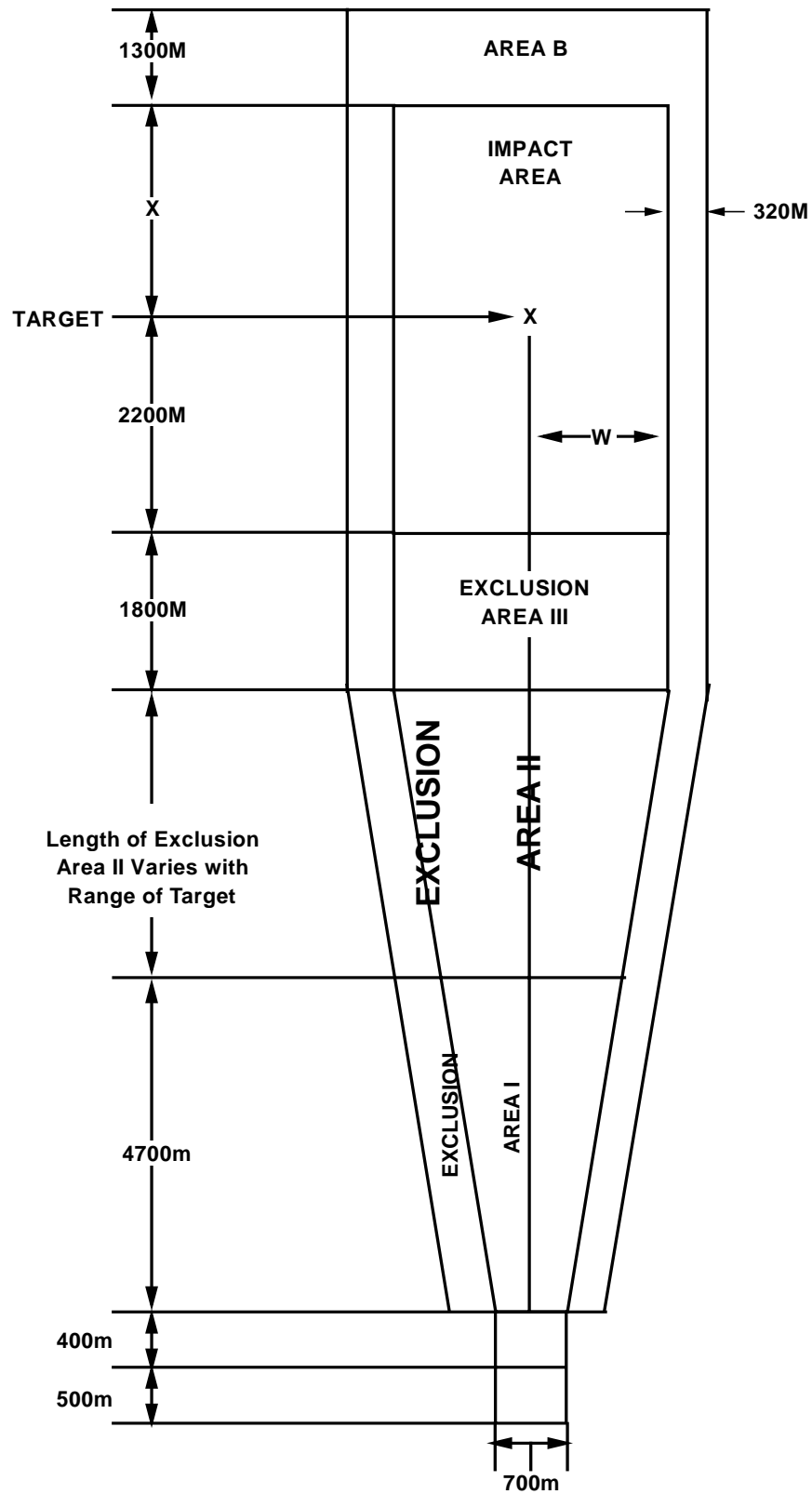
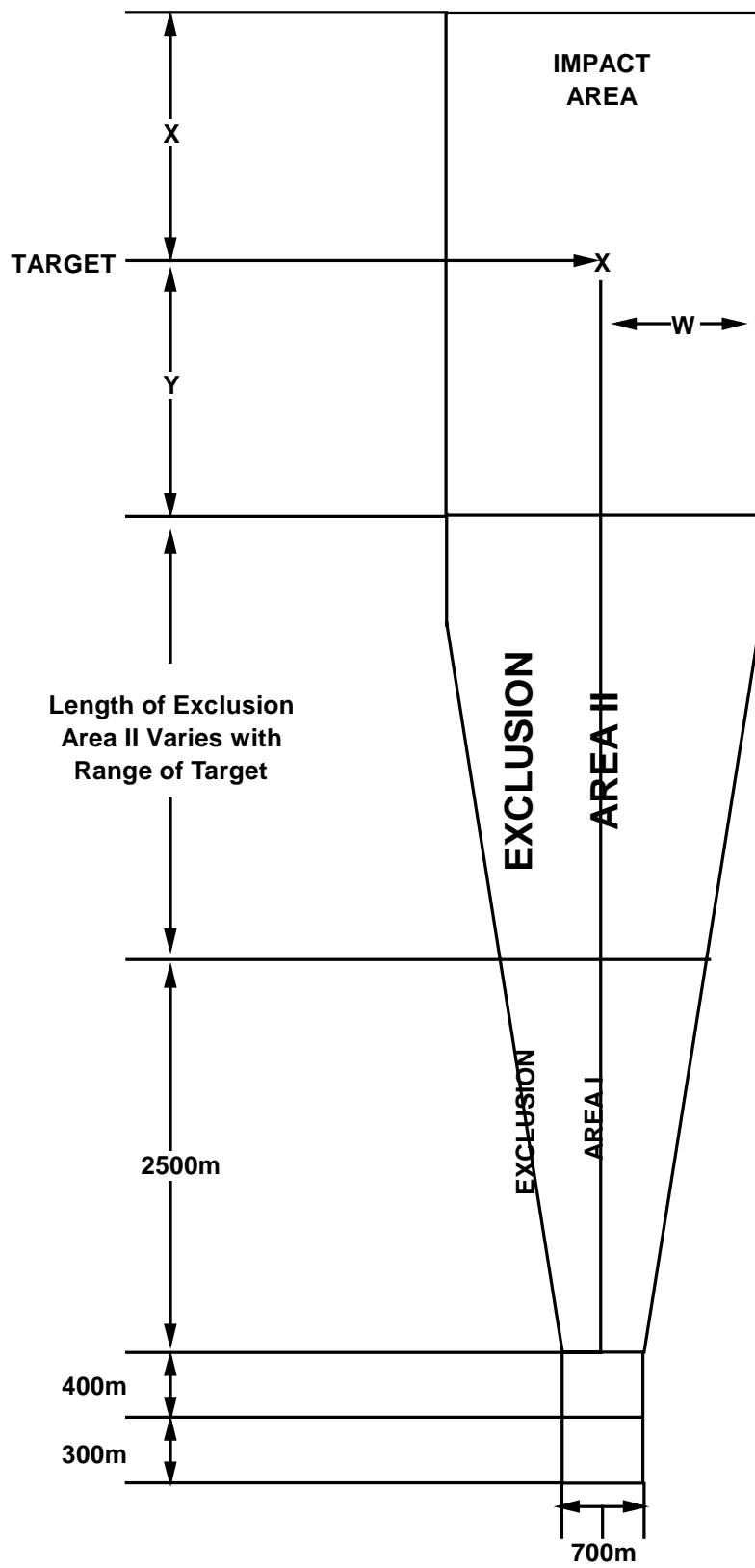


Figure M-2.--Surface Danger Zone for MLRS M-28 Rocket



SOP FOR RTAA

Figure M-3.--Surface Danger Zone For RRPR

SOP FOR RTAA

Dimensions of area and range in meters for M-28 Rocket

RANGE TO TARGET	AREA W	DISTANCE X
MIN to 11,500	840	Note 1
11,501 to 15,000	1,000	5,000 + H Note 2
15,501 to 20,000	1,300	3,700 + H Note 2
20,001 to 23,000	1,500	1,900 + H Note 2
23,000 to 27,000	1,900	2,300 + H Note 2
27,001 to Max	2,900	2,700 + $\frac{1}{2}$ H Note 2

Notes:

1. For targets less than 11,500 meters from the launcher, distance X shall vary so that the distance from the launcher to the far edge of the impact area shall be 16,700 + H meter. Adding area B results in a minimum required distance of 18,000 + H meters for short range shots.

2. H is the height of launcher above mean sea level (MSL) in meters.

Table M-1

Dimensions of area and range in meters for M-28A1 RRPR

RANGE	DISTANCE X	DISTANCE Y	AREA W
8,000 to 9,000	2,450	1,930	560
9,001 to 10,000	2,100	1,500	630
10,001 to 11,000	1,800	1,180	685
11,001 to 12,000	1,560	900	760
12,001 to 13,000	1,475	600	850
13,001 to 14,000	1,580	450	950
14,001 to 15,000	1,760	350	1,050

Table M-2

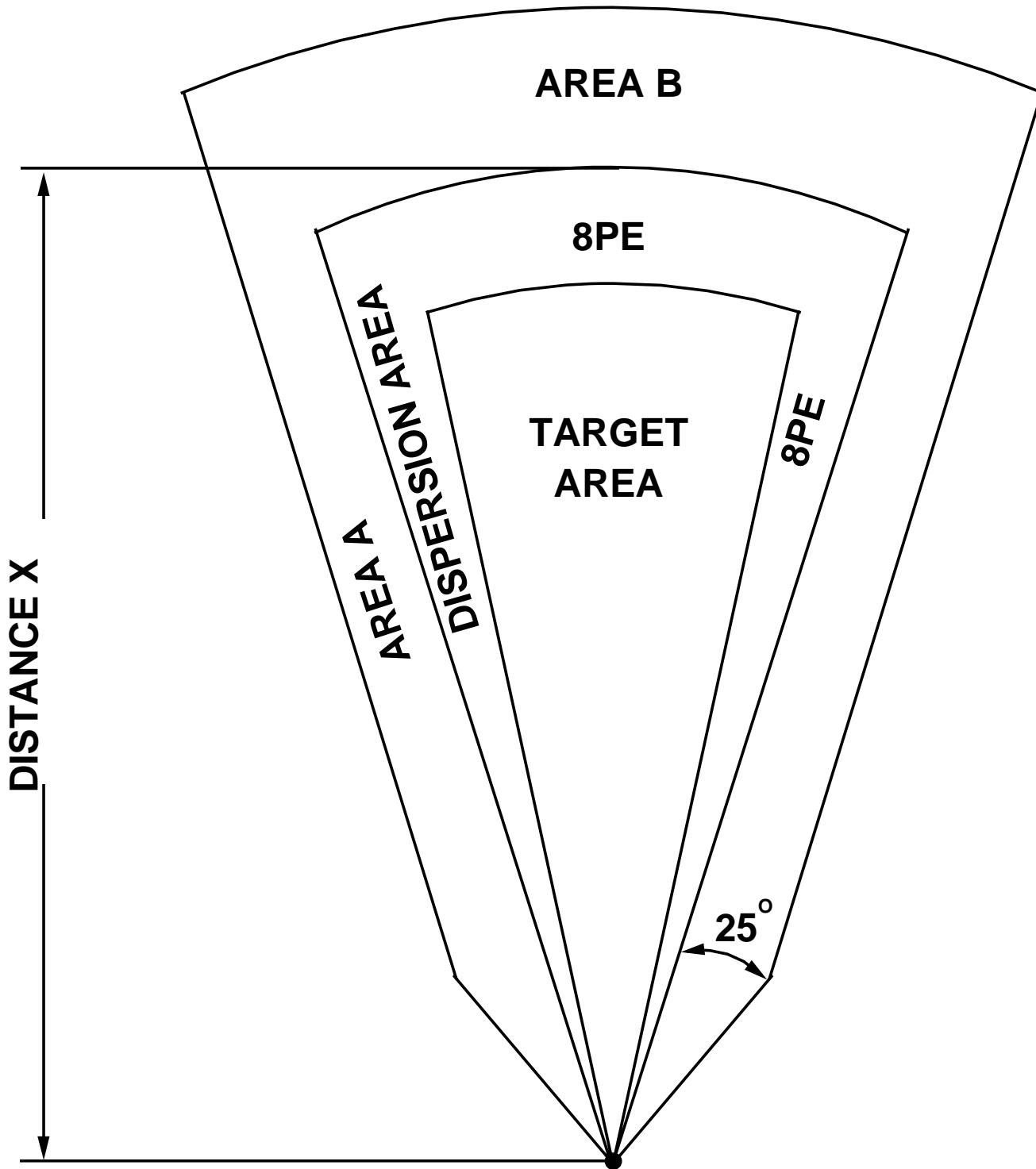


Figure M-4.--Surface Danger Zone for Mortars

SOP FOR RTAA

APPENDIX N

SMALL ARMS LIVE FIRE AND MANEUVER AND EMPLOYMENT

1. General. Range safety procedures in this appendix are designed to assist the small unit leader in understanding some of the inherent hazards encountered in live fire and maneuver situations. The Range Management Office and the Range Safety Office are available to assist units with safety issues, surface danger zones (SDZ's) or options as to where training can be accomplished.

2. Surface Danger Zones (SDZs). A Surface Danger Zone (SDZ) is the ground and airspace designated within a training complex or range (to include associated safety areas) for vertical and lateral containment of projectiles, fragments, debris, and components resulting from the firing, launching, or detonation of weapon systems to include explosives and demolitions. Figures N-3 and N-4 contain required information for constructing a SDZ for small arms weapons. Figure N-5 shows how to construct a SDZ when engaging multiple targets.

3. Overhead Fire

a. Overhead small arms fire above the heads of protected troops is authorized when minimum protection shown in table N-1 is provided. Table N-1 shows the thickness of various materials needed to positively protect against individual projectile impacts. The material thickness will provide adequate protection against single round impacts, but not automatic fire.

NATURE OF COVER	THICKNESS IN INCHES		
	AMMUNITION CALIBER		
	5.56	7.62	.50 CAL
Concrete (5000 psi)	5	13	21
Broken stone	6	14	22
Dry sand	7	15	23
Wire oak logs	8	16	24
Packed earth	9	17	25
Undisturbed compacted earth	10	18	26
Freshly turned earth	11	19	27
Plastic clay	12	20	28

Table N-1

Minimum thickness of material for positive protection
against caliber ammunition listed

b. Ideally, overhead fire is delivered when there is a depression in the terrain between the gun position and the target. The depression should place the gunner's line of aim well above the heads of friendly troops.

c. Overhead fire above unprotected troops with small arms may be conducted when the following is strictly adhered to:

SOP FOR RTAA

(1) Weapons systems authorized for overhead fire of unprotected troops are 7.62mm and caliber .50 machine guns on ground tripods.

(2) Do not deliver overhead fire if the range from the gun to the target is less than 350 meters or more than 850 meters for 50 cal and 300 meters to 750 meters for 7.62mm.

(3) Only Condition Code "A" ammunition is certified for overhead fire.

(4) Hand-held, shoulder-fired, or flex-mounted weapon systems will NOT be used. Flex-mounted weapons systems are those that permit firing through a part of an arc or a complete arc and do not have positive stops provided to limit elevation, depression, and traverse of weapon during firing.

(5) Rates of fire will not exceed 70 rounds per minute for 7.62mm machine guns and 40 rounds per minute for .50 caliber machine gun.

(6) Sketch maps will be drawn depicting location of all targets and location of all fire and maneuver units. Copies will be turned into Range Safety prior to deployment to the field.

(7) Overhead fire with machine guns in live-fire exercises will be as follows:

(a) Firing positions for weapons delivering overhead fire will provide unobstructed field(s) of fire. Weapons will be positioned so that the direction of fire prevents projectiles from striking trees, rocks, or any other obstacles in the vicinity of unprotected troops.

(b) Positive stops must be used to prevent crossfire and depression of weapon systems during overhead firing.

(c) Applicable ballistic tabular firing tables will be used to determine the minimum angle of elevation for all overhead fire. Projectiles will not be permitted to impact between the firing position and unprotected troops downrange. All impacts shall not be less than 50 meters beyond the Marine most distant from the weapon.

(d) Weapons WILL BE TEST FIRED to determine the minimum vertical clearance. This minimum vertical clearance is the distance between the lowest shot in the dispersion pattern as determined by test firing and the highest point of ground, log, or other obstacle over which troops must travel or heights of barbed wire strands or posts on the range, whichever is higher. A MINIMUM of 2.5 meters (8 feet) over the heads of unprotected troops AND the highest obstruction within the field of fire will be maintained.

(e) Care will be taken in choosing targetry when engaging in overhead fire. Hard targets, i.e., tanks, hulks, or large rocks or any target that can cause ricochets will NOT be engaged.

(f) FM 23-65 and MCWP 3-15.1 contain procedures to compute safety for overhead fire. Figures N-1 and N-2 depict examples of overhead fire.

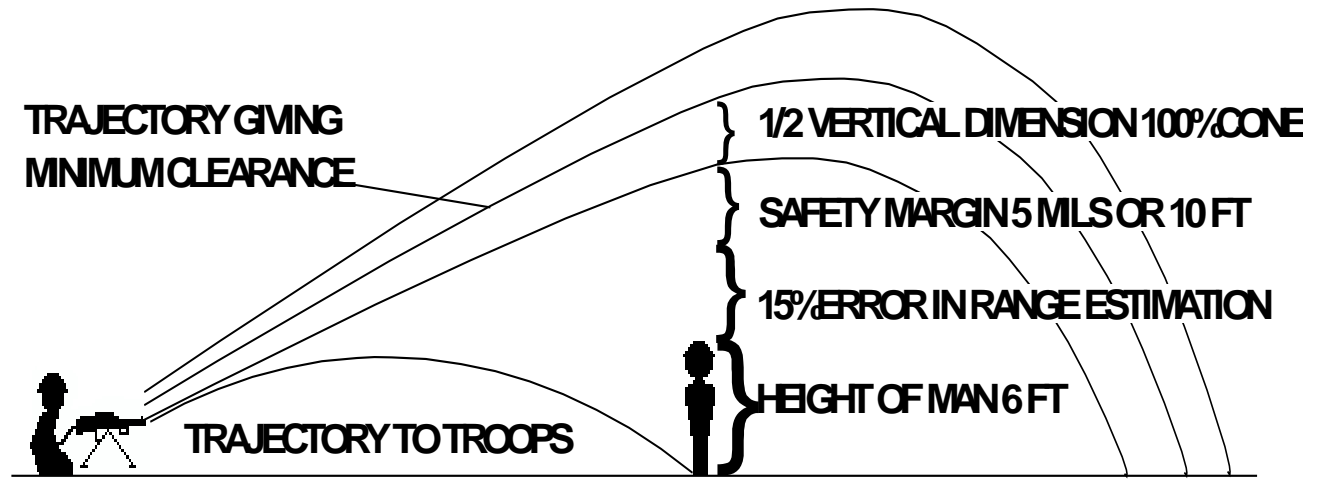


Figure N-1.--Components of Minimum Clearance

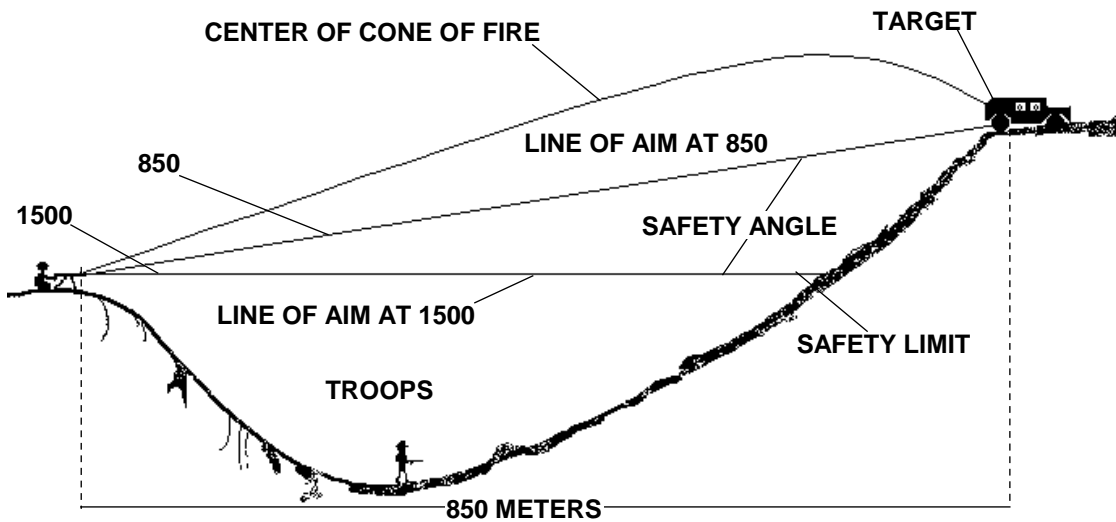


Figure N-2.--Application of Gunner's Rule

SOP FOR RTAA

4. Flanking Fire (Envelopments)

a. Ground mounted small arms may be used to provide low angle flanking fire.

b. The route and location of the maneuver units and location of the weapons providing flanking fire (Base of Fire) will be described in detail, using recognizable natural and or manmade terrain features (streams, roads, etc..) or other positive identification features such as engineer tape, to ALL involved personnel.

c. Positive, redundant communications (radio, smoke, pyro, etc..) between the Base of Fire and maneuver elements will be established and maintained.

e. A recon of the area is required.

f. Rehearsals will be conducted.

g. Care must be taken that NO hard targets, i.e., tanks, hulks, large rocks are engaged when employing flanking fire.

h. The distance from the base of fire to the objective should not exceed the tracer burnout distance for the weapon system being used.

i. Because of the danger of lateral ricochets, flanking fire should be planned using the SDZ data in Figures N-3 through N-5 (Pages N-9 through N-11) and should be considered the principle means for constructing the Surface Danger Zone (SDZ) for this type of training. However, if this proves to be tactically unfeasible, then the Surface Danger Zone (SDZ) contained in Figure N-6 (Page N-12) may be used and the following minimum conditions apply:

(1) An angle of 15 degrees (267 mils) or more must be maintained between the limit of fire provided by the Base of Fire and the near flank of the closest individual of the maneuvering unit. Projectiles must never impact any closer to unprotected troops than 100 meters unless positive protection is provided by the terrain. The RSO MUST shut down the base of fire (BOF) if the exercise force fails to do so when the enveloping force starts to maneuver within this area (see diagram on page N-12).

(2) Projectiles must not impact any closer to unprotected troops than 100 meters unless positive protection is provided by the terrain.

(3) Only non-explosive and non-discarding sabot projectiles may be used.

(4) The Base of Fire will be positioned so as to have a clear unobstructed view of the objective.

(5) Recommend that the units who do not normally conduct live fire and maneuver infantry operations brief Range Safety (ext. 7112) prior to execution of live fire exercise.

NOTE: THE PROCEDURE OF USING 50 METERS FOR 7.62 AND BELOW AND 100 METERS FOR .50 CAL WILL NOT BE USED. SEE PARAGRAPHS 4i.1 AND 4i.3 ABOVE FOR PROPER SAFE SEPARATION DISTANCES.

SOP FOR RTAA

5. M-203

a. General. The SDZ for the M-203 is depicted in Figure N-7.

b. Precautions

(1) HE/HEDP and Target Practice round B-577 are authorized to be fired on R-104 only.

(2) All other rounds are authorized in the range training areas.

(3) The M- 203 is not authorized for overhead fire.

6. MK-19 MOD 3

a. General. Figure N-8 depicts the MK-19 MOD-3 surface danger zone.

b. Precautions

(1) Do not train with the 40mm combat ammo at ranges less than 310 meters.

(2) Train with 40mm practice ammo between 75 and 310 meters.

(3) Train to engage targets at ranges greater than 75 meters.

(4) Helmet, Body armor, hearing protection, and eye protection equivalent to the sun, wind, and dust goggles with ballistic inserts are to be worn at all times by the gun crew when firing the MK-19 using HE/HEDP ammunition. The goggles are standard DSSC items.

(5) 40mm HE/HEDP and Target Practice (B-584) are restricted to Range 110.

(6) The MK-19 is not authorized for overhead fire.

(7) Currently B-576 is the only authorized round that may be fired in the Range Training Areas and on ranges other than Range 110 (see appendix B).

NOTE: UNITS SHOULD NOT DEPLOY TO THE FIELD WITHOUT THE ROUND REMOVAL TOOL. THIS TOOL WILL BE USED TO REMOVE MISFIRES FROM THE WEAPON. DO NOT USE ON SPENT CASINGS BECAUSE DAMAGE TO BORE AND TOOL WILL OCCUR. (NEVER USE M383 PROJECTILES. THIS IS NOT A MK-19 ROUND, BUT HAS BEEN ISSUED BY MISTAKE IN THE PAST).

7. SMAW

a. General. Figure N-9 depicts the SMAW surface danger zone for firing both the practice and HE rounds.

b. Precautions

(1) Rockets will not be fired overhead of troops.

(2) All loading preparations for firing and unloading shall be performed with the muzzle pointed downrange.

SOP FOR RTAA

(3) The SMAW may be fired in any live fire training area or designated numbered ranges (see Appendix B).

(4) Do not engage targets less than 150 meters in range for training.

(5) Ensure entire back-blast area is clear prior to firing.

8. AT-4

a. General. Figure N-10 depicts the Surface Danger Zone for the AT-4.

b. Precautions

(1) Before firing the AT-4 weapon system, the entire SDZ shall be clear of all non-mission essential personnel.

(2) Firing shall be accomplished with pre-determined boundaries. RSOs will ensure that a SDZ exists on the Gun Target Line for each anticipated firing position within the pre-determined boundaries.

(3) Procedures and precautions outlined in AT-4 FMs and TMs shall be observed in all preparation and firing operations.

(4) Personnel shall never stand or permit any part of their body to be directly behind or in front of the AT-4 while a cartridge is in the chamber.

(5) The minimum target engagement distance is 50 meters (HEAT projectile is fully armed at 20 meters).

(6) The use of manned target vehicles is prohibited. Moving target vehicles must be operated by remote control with operating personnel located outside the SDZ.

(7) When engaging moving targets, the AT-4 should be fired so that impact with the target occurs as near to the centerline as possible.

(8) The AT-4 will not be fired from within buildings or within 5 meters of any vertical or nearly vertical backstops, barriers, or obstacles due to risk of debris ricochets.

(9) The Dispersion and Ricochet Areas must be added to the left and right limits of fire when engaging moving targets.

(10) Firing over the heads of troops is prohibited.

(11) Approved hearing protection is required to be worn by all personnel within 25 meters of the weapon. Only E-A-R polymer foam plugs are authorized as approved hearing protection.

(12) The AT-4 will NOT be fired from a foxhole or the prone position. The 9mm tracer bullet training device is the only authorized system to achieve proper training on firing from a foxhole or prone position.

SOP FOR RTAA

(13) Only one (1) round may be fired from the sitting position in a 24 hour period.

(14) Only six (6) rounds may be fired from a kneeling or standing position in a 24 hour period.

9. 60mm and 81mm Mortars

a. General. Procedures for firing mortars are outlined in Appendix M of this manual. Example of a mortar SDZ is contained in Figure N-9.

b. Precautions

(1) MORTARS ARE NOT AUTHORIZED FOR OVERHEAD FIRE OF TROOPS.

(2) Mortar impacts are not allowed any closer than the distance of areas A or B of the specific SDZ for that mortar. All probable errors (PEs) must be computed to determine the left and right lateral limits of the target area.

(3) Mortars are authorized in all live-fire training areas and on specific numbered ranges (see Appendix B).

(4) 81mm practice rounds are NOT authorized on Range 400.

10. DRAGON and DRAGON Generation II

a. Firing conditions.

(1) The entire SDZ will be cleared of all non-mission essential personnel.

(2) Only those personnel actively engaged in firing and control of the missile will be permitted in the SDZ at the time of firing.

(3) The gunner and all other personnel in caution areas 1, 2, and/or 3 will wear flak jacket, helmet, eye protection, and single hearing protection.

b. The SDZ requirements for firing the DRAGON and DRAGON Generation II are found in Figure N-12.

c. The minimum arming distance of the M-22 HEAT round is 30 meters.

d. Personnel will not stand or permit any portion of their bodies to be directly behind or in front of the launcher when the tracker and missile are mated.

e. The missile will not be fired from within buildings or other enclosures or within 50 meters of a vertical or nearly vertical backstop.

SOP FOR RTAA

11. TOW Missiles

a. Firing conditions.

(1) Before firing any TOW, the entire SDZ will be cleared of all non-mission essential personnel.

(2) Only those personnel actively engaged in firing and controlling TOW missiles may be permitted in the SDZ. All other personnel should be located in protective sites, such as behind a berm.

(3) Personnel will neither stand nor permit any part of their body to be directly behind or in front of the TOW launcher while a missile is in the launch tube.

(4) TOW missiles will not be fired from within buildings or within 100 meters of any vertical or near vertical backstop.

(5) The range shall be inspected after TOW firing activities to ensure, to the maximum extent possible that all guidance wires are removed from the range or the RTA.

b. The SDZ for TOWs is contained in Figure N-13. This SDZ contains areas that are waiverable or have been reduced by the type of missile being used (Area H may be reduced). Chapter 15 of the reference has specific details in regards to this situation.

NOTE: THE TOW PROTECTIVE BLANKET (KEVLAR) IS REQUIRED WHEN FIRING TOW MISSILES.

12. JAVELIN

a. The JAVELIN is shoulder launched, man portable, anti-armor weapon system. It fires a passive imaging infrared missile with a lock on before launch (LOBL) guidance system.

b. Firing conditions

(1) Before firing any JAVELIN missile, the entire SDZ will be cleared of non-mission essential personnel.

(2) Personnel will neither stand nor permit any part of their body to be directly behind or in front of the JAVELIN launcher.

(3) The SDZ's for the JAVELIN are found in Figure N-14 and N-15. Currently there are some computer software problems. Figure N-14 is current SDZ criteria. Refer to publication ULSS 09397A for details. Figure N-15 will be the criteria for SDZ when problems contained in ULSS 09397A have been resolved.

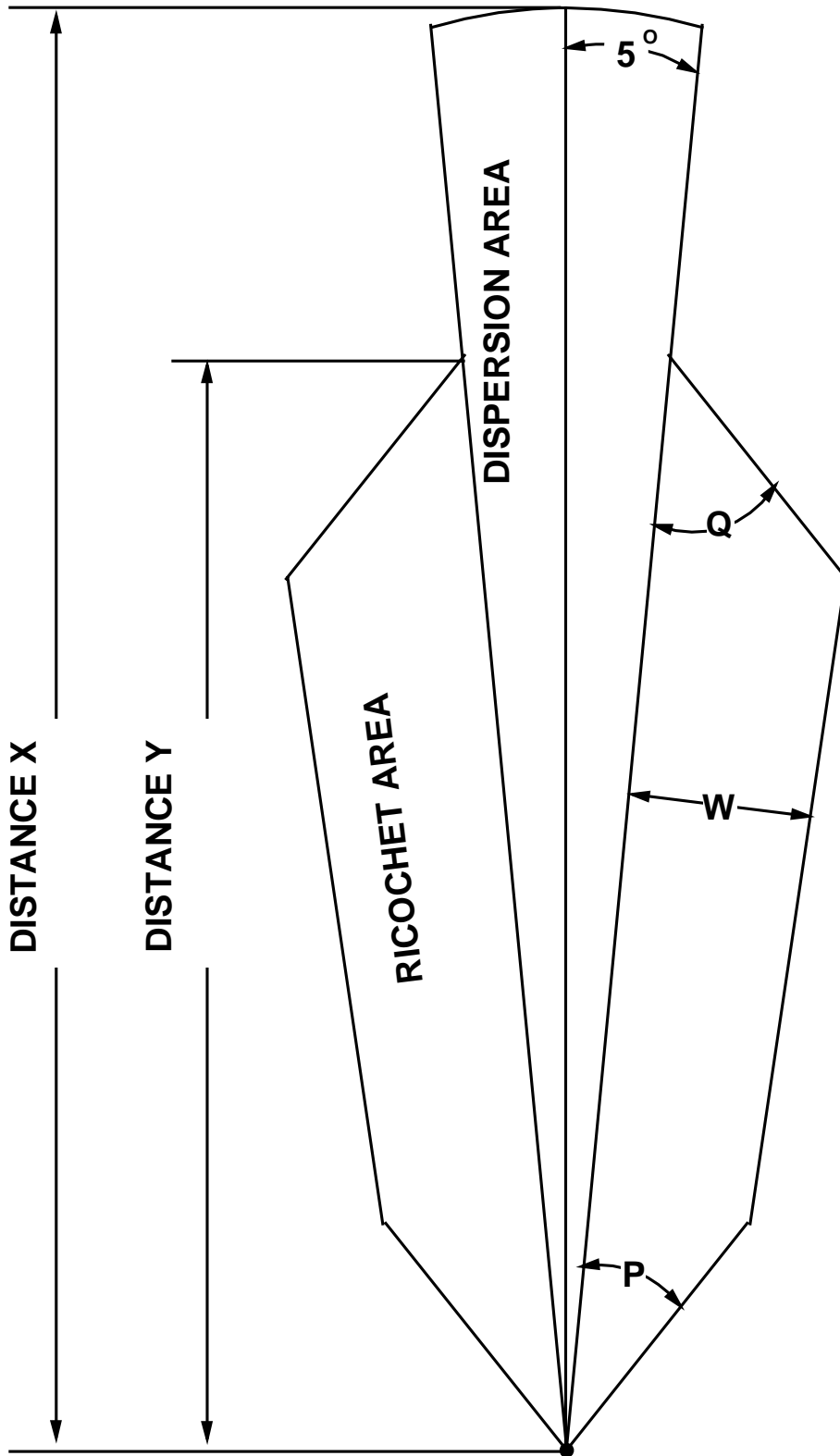


Figure N-3.--Surface Danger Zone for Direct Fire Weapons without explosive projectiles

SOP FOR RTAA

Caliber	Impact	Meters				Degrees	
	Media	Dist X	Dist y	Area W	Vert Haz	Angle P	Angle Q
12 Gage Slug	Earth/Water Steel/Concrete	1073 1073	710 830	125 287	136 197	21.96 56.91	33.34 40.17
.22 Cal Long Rifle, M24	Earth/Water Steel/Concrete	1400 1400	1033 1125	155 386	96 345	24.00 63.40	15.90 30.30
.38 Caliber M41 ball	Earth/Water Steel/Concrete	1806 1806	1258 1258	153 389	89 245	22.57 60.95	16.07 35.36
9mm M882, Ball	Earth/Water Steel/Concrete	1800 1800	1077 1211	158 399	93 253	23.10 61.10	15.80 30.40
.45 Cal, M1911 Pistol/SMG	Earth/Water Steel/Concrete	1690 1690	1016 1111	117 290	100 186	21.11 54.74	16.69 30.77
5.56 mm, M193 Ball	Earth/Water Steel/Concrete	3100 3100	2004 1666	458 323	319 219	35.20 19.00	23.10 26.90
5.56 mm, M196 Tracer	Earth/Water Steel/Concrete	3100 3100	2066 2023	514 243	355 243	35.10 19.20	26.80 22.80
5.56 mm, M855 Ball	Earth/Water Steel/Concrete	3437 3437	2029 1810	462 334	325 229	34.20 18.80	22.40 25.20
5.56 mm, M856 Tracer	Earth/Water Steel/Concrete	3089 3089	1607 1592	355 277	261 261	32.80 18.60	23.20 21.00
5.56 mm, M862 Plastic	Earth/Water Steel/Concrete	250 250	165 136	24 5	16 4	15.40 3.30	20.00 7.30
7.62mm, M118 Special	Earth/Water Steel/Concrete	5288 5288	4800 5137	1545 990	752 490	43.81 20.17	38.73 41.29
7.62mm, M80 Ball	Earth/Water Steel/Concrete	4100 4100	4073 4053	1461 861	706 447	43.54 20.04	38.90 75.54
.50 cal, M858 Ball, Plastic	Earth/Water Steel/Concrete	700 700	398 415	20 53	41 41	4.28 11.65	9.16 21.14
.50 cal, M860 Tracer, Plastic	Earth/Water Steel/Concrete	700 700	398 415	20 53	41 41	4.28 11.65	9.16 21.14
.50 cal, M2 AP	Earth/Water Steel/Concrete	6100 6100	5142 4300	1659 718	904 462	40.80 16.30	69.60 33.10
.50 cal, M-2 Ball	Earth/Water Steel/Concrete	6500 6500	5211 4147	1652 714	901 478	38.19 16.03	63.35 44.13
20mm, M220 TP-T	Earth Water Steel Concrete	3940 3940 3940 3940	3340 3040 3290 3260	581 558 804 765	317 311 513 447	25.83 26.08 36.66 34.33	22.83 30.96 47.76 34.09
20mm, M55A2 TP	Earth Water Steel Concrete	4500 4500 4500 4500	3780 3500 3290 3260	733 737 1025 969	357 350 585 509	25.74 26.16 38.14 34.12	33.20 36.66 36.82 37.78
30mm, M788 TP-T	Earth Water Steel Concrete	4020 4020 4020 4020	3116 3252 3631 3600	636 730 1023 874	311 298 524 451	24.93 25.19 36.78 30.66	40.37 28.65 33.18 35.59

Figure N-4--Area Dimensions for Direct Fire Weapons SDZ
without explosive projectiles

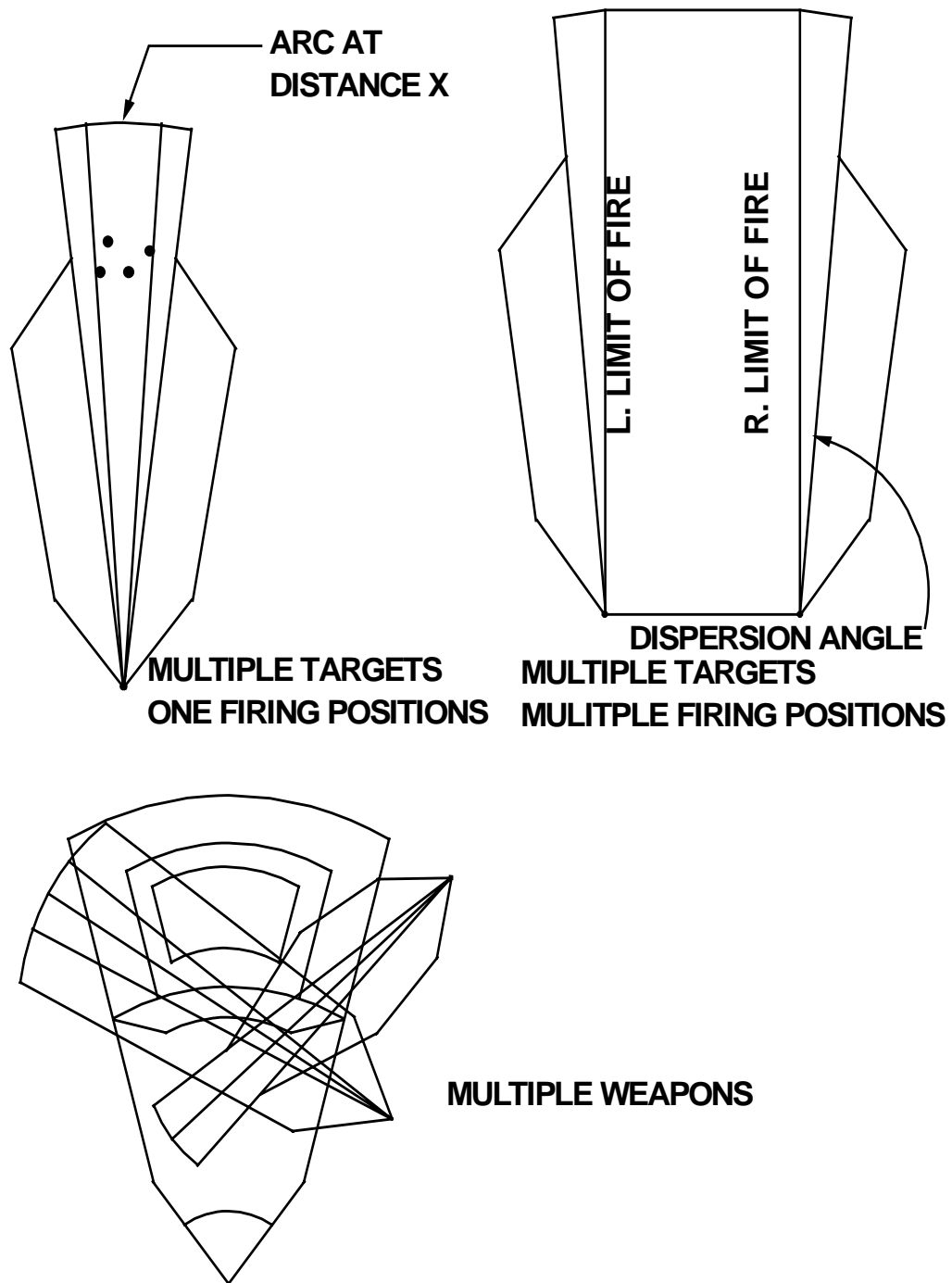
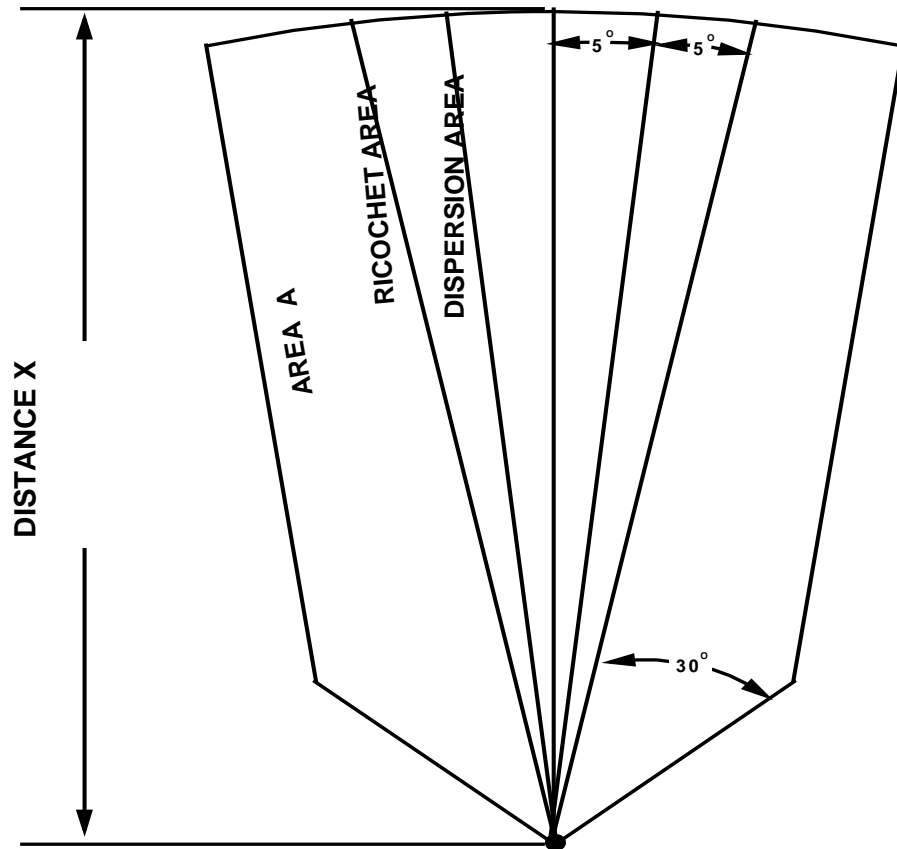
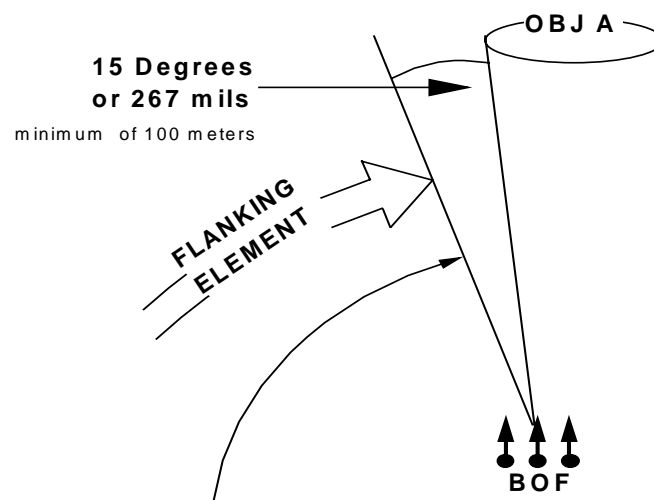


Figure N-5.--SDZ Variations
Multiple Targets and Multiple Firing Points

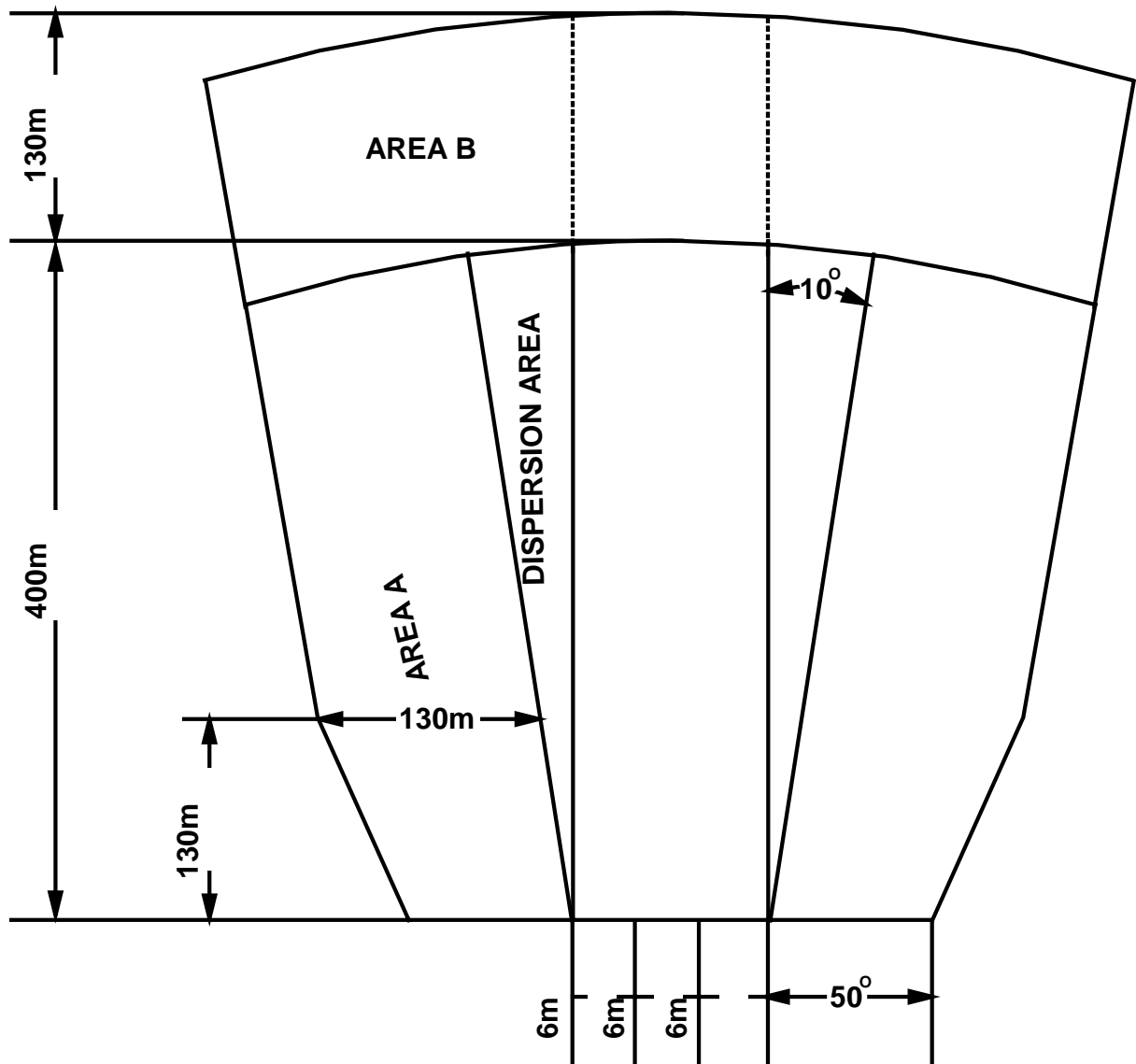


SDZ for Direct Fire Weapons Used in Flanking Fire



WHEN THE MANUEVER FORCE REACHES THIS POINT THE RSO MUST EITHER SHIFT THE BASE OF FIRE OR CEASE FIRE

Figure N-6,... Diagrams for Direct Fire Weapons Used In Flanking Fire

**NOTES:**

1. Prohibit cross-line firing when using multiple firing.
2. Maximum range (400m) may be reduced when positive elevation control devices are used to limit range to impact distance.

Figure N-7,...SDZ for M-203 Grenade Launcher

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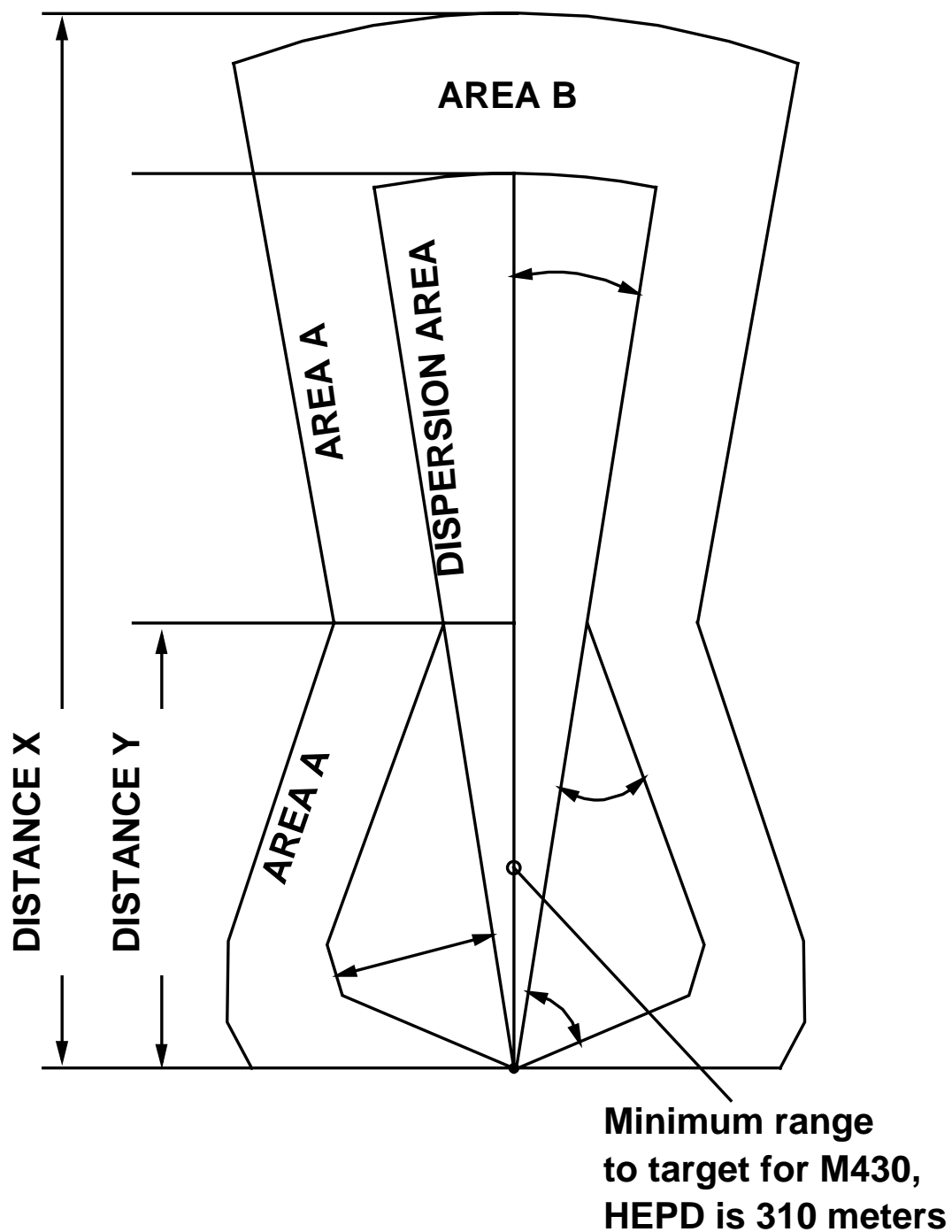


Figure N-9.--SDZ FOR MK-19

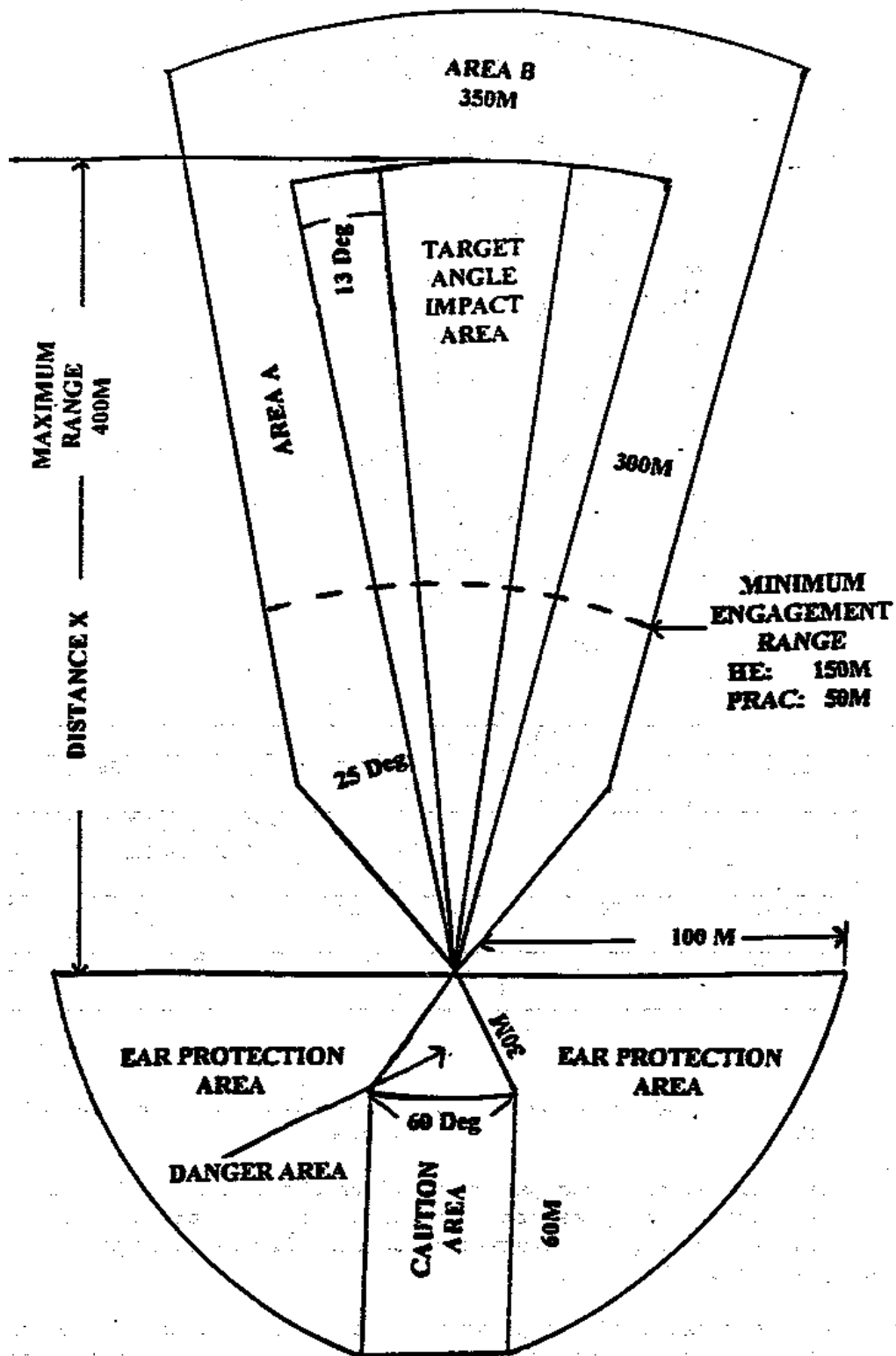
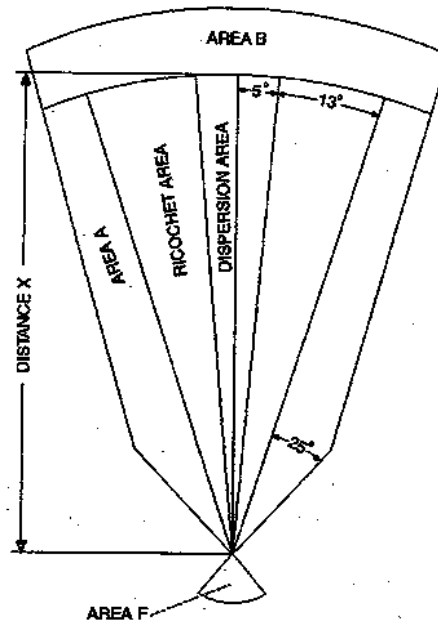


Figure N-9.--SDZ for SMAW

SOP FOR RTAA



TYPE	DISTANCE X	MIN RANGE TO TARGET	AREA A	AREA B	AREA F	
					PRIMARY DANGER ZONE DEPTH	CAUTION AREA DEPTH
84mm HEAT M136	2,100 M	50 M	227	488	5	100
9MM Trainer m939	1,600	N/A	N/A	N/A	N/A	N/A

NOTES:

1. Area F is 90 degree angle (45 left and right) of rearward extension of launcher target line.
2. Primary danger zone occupation could result in fatalities or serious casualties including severe burns or permanent hearing loss. The hazards are base plate fragments, debris, fireball, high noise levels and overpressure.
3. Caution area is an extension of the primary danger area. Occupation of this area could also result in severe casualties due to back blast, debris, high noise levels and possible base plate fragments. Primary danger area and caution area are conditions that may not be modified.

Figure N-10.--SDZ for AT-4

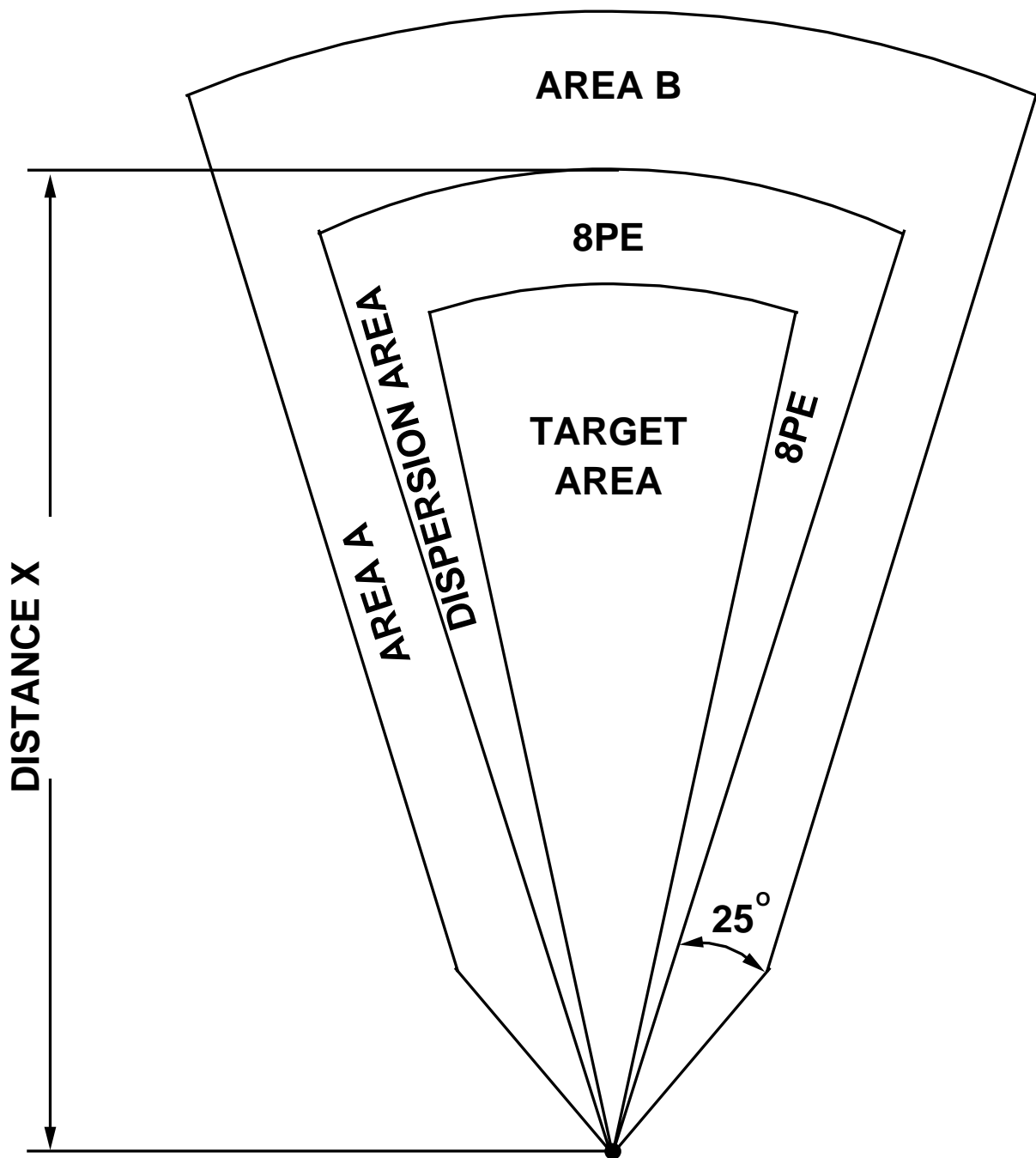
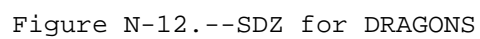
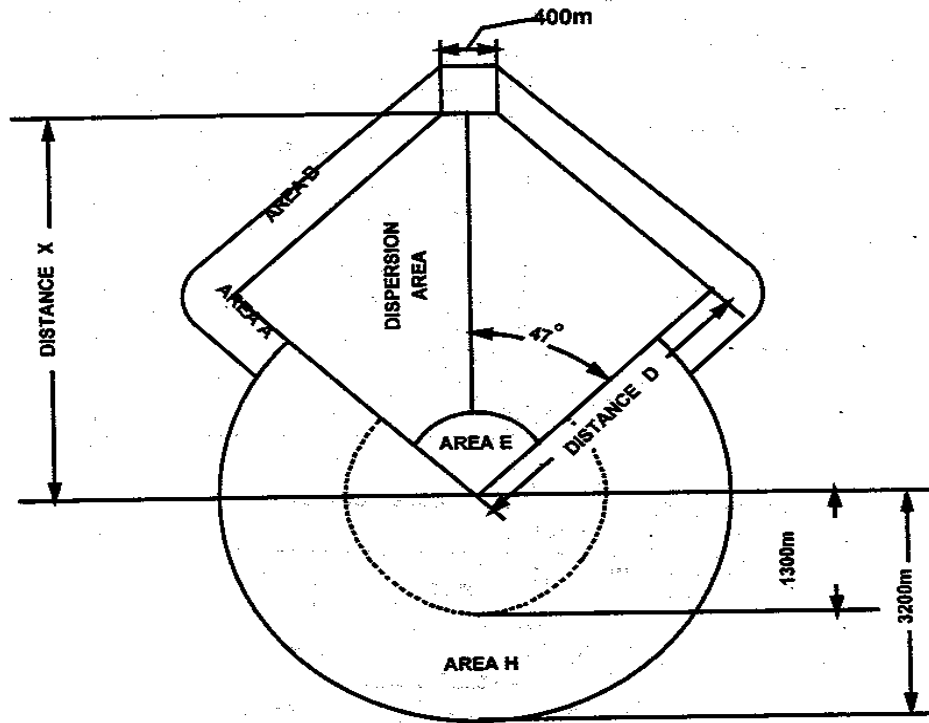


Figure N-11.--SDZ for Mortars



SOP FOR RTAA



Basic TOW, ITOW, TOW2, AND TOW 2A Missile Range Distance

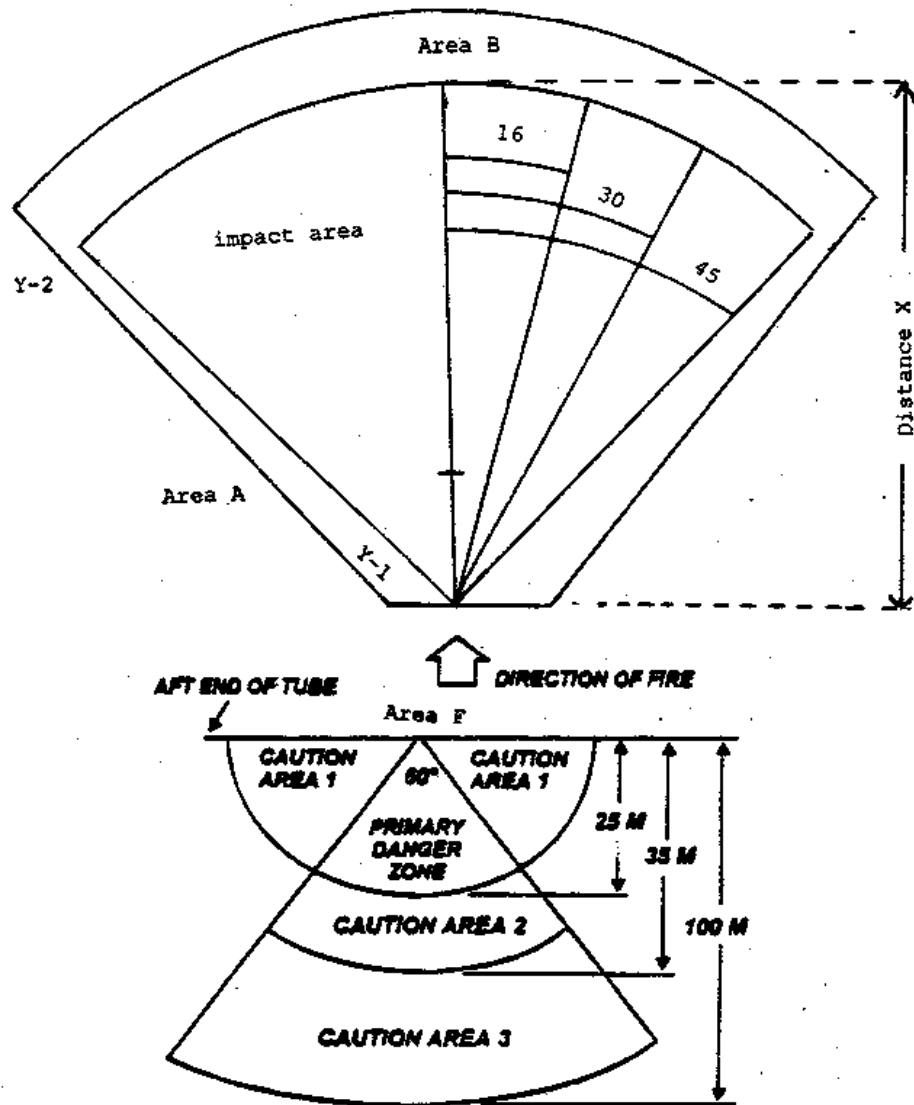
GROUND		AERIAL				
Airspeed (Knots)	0	Hover	Hover 50	100	100	150
Altitude (Feet)	0	0-50	50-100	50-100	500	1,000
Distance X	5,000 m	5,100 m	5,300 m	5,500 m	5,700 m	6,000 m
Distance D	3,800 m	3,900 m	4,100 m	4,300 m	4,500 m	4,800 m

Basic TOW, ITOW, TOW2 AND TOW 2A Missile Danger Areas

	AREA A	AREA B	AREA H
Inert Warhead	100 m	100 m	Not Required
High Explosive Warhead	750 m	750 m	3,200 m

Figure N-13.--SDZ for TOW

SOP FOR RTAA



Distance X = 4,000 meters
 Area A = Y-1 = 500 meters (live) 200 meters (inert)
 Y-2 = 200 meters (live) 100 meters (inert)
 Area B = 500 meters
 Motor burnout at 1,000 meters
 16 degrees = 1:10,000 probability
 30 degrees = 1:100,000 probability
 45 degrees = 1:1,000,000 probability

Figure N-14.--SDZ for JAVELIN

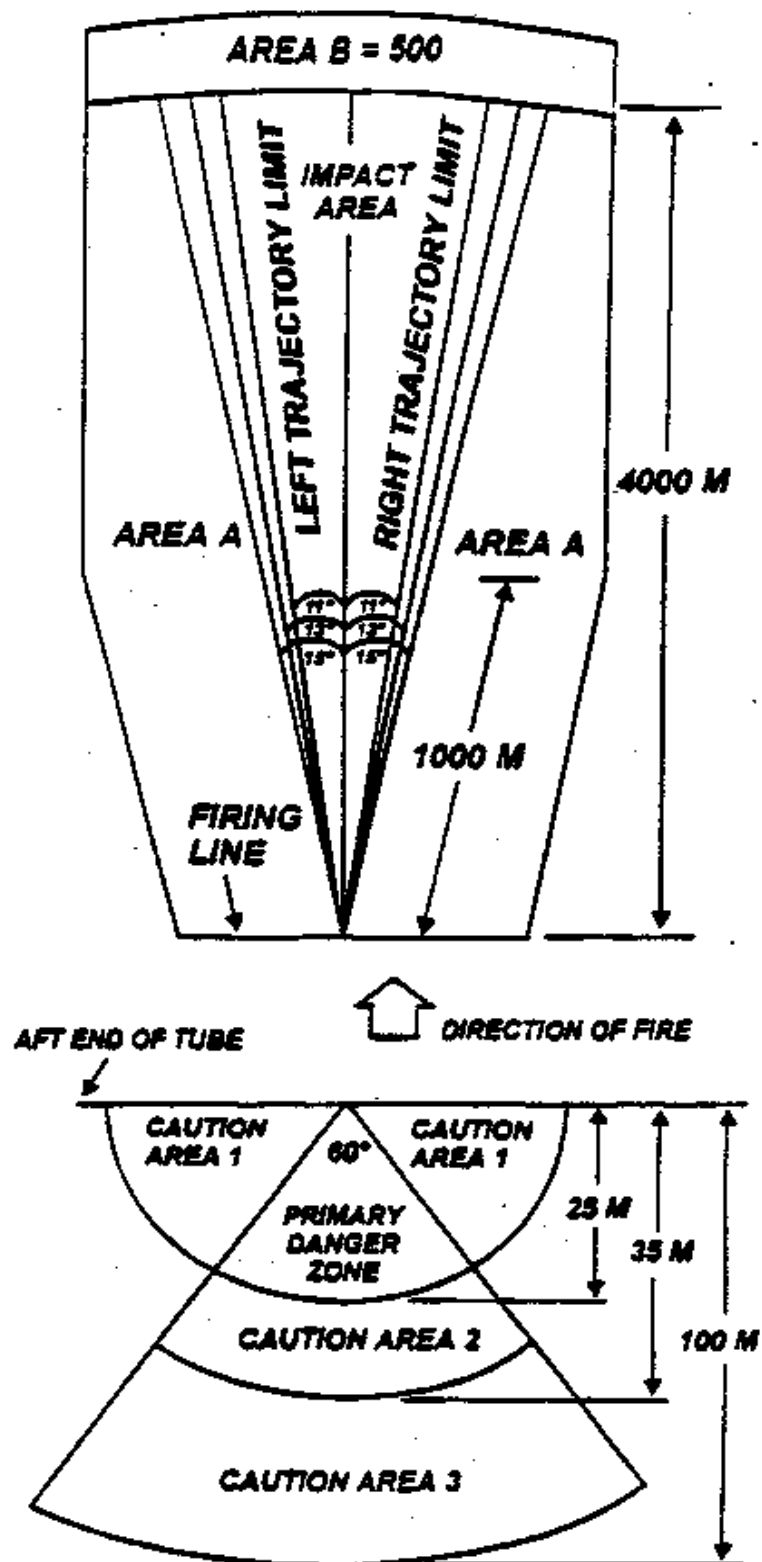


Figure N-15,--SDZ for JAVELIN

SOP FOR RTAA

APPENDIX O

ARMORED VEHICLES

1. General

a. This Appendix addresses procedures and guidelines for the employment of tanks, LAV's, and AAV's and their associated weapon systems.

b. The following general guidelines shall always apply when employing direct fire, flat-trajectory weapons:

(1) Flat-trajectory weapons used in a direct fire role will not be fired over the heads of troops.

(2) Unprotected personnel in the vicinity of the weapon will be alerted prior to firing.

(3) Hard targets that could result in ricochets (i.e.. armor hulks, rocks, etc..) will not be engaged at ranges less than 700 meters regardless of type of round being used.

(4) Targets that produce fragmentation when hit may not be engaged at ranges less than 200 meters.

(5) Troops or vehicles that are forward of direct fire weapons will observe SDZ relative to targets being engaged. Direct fire weapons will not engage targets when troops or vehicles are within respective SDZ.

(6) Tank maneuver in proximity of targets being engaged by direct fire weapons will be guided by the appropriate safety fan for the weapon being employed.

(7) Troops and vehicles maneuvering to the rear of direct fire weapons may utilize the appropriate minimum engagement ranges for the weapons being employed as the safe separation distance between themselves and the target being engaged (i.e.. tank/infantry assault with tanks leading).

2. Armored Vehicle Safety

a. The vehicle commander is responsible for all that happens on or around his vehicle.

b. Positive control procedures shall be employed to ensure safe passage of armored vehicles through infantry lines or other congested areas. During periods of darkness or reduced visibility, passage of armored vehicles through infantry lines will be accomplished with the use of ground guides and previously marked lanes as a minimum. Armor guards will be posted over sleeping troops when armored vehicles are operating in the area. During the conduct of live fire/non-live fire operations, there shall be no personnel riding on the outside of the tank.

c. Armored vehicles equipped with fully operational stabilization systems may load and fire on the move.

d. The vehicle commander shall not give the command of execution to fire until he has determined his sector of fire is clear of all other vehicles or troops based upon the type of round being fired.

e. At no time shall tanks exceed 5 degrees (85 mil) super elevation. LAV's have an established 15 degree elevation for air defense.

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f. The following firing safety regulations will be used for firing when using stabilization:

- (1) Battlesight range for HEAT-T will not exceed 1,000 meters.
- (2) Battlesight range for TPCSDS-T will not exceed 1,200 meters. (If range is set for 1,200 meters the impact zone extends from firing tank to 1,600 meters)
- (3) The loader's safe/armed handle will be in the safe (down) position and the main gun switch will be on safe until the fire command is given.
- (4) Tank main gun can fire safely as long as the tank can compute a ballistic solution to the target. The gun will fire the last known range that was imputed into the computer if the tank has a flashing range in the sights.
- (5) In every tank engagement (battle sight or precision), the tank commander will ensure a member of the crew (normally the wing man) is in a position to observe the impact of his round prior to his command of execution, ensuring that the sector of fire is clear.

g. In every case, the gun target line will be checked for clearance by the armored vehicle commander prior to firing. (All weapons, i.e.. main gun, 50 cal, M240, M242 etc.)

h. The main gun will NOT be fired with troops mounted outside the turret.

i. At no time will the M1A1 7.62mm Loaders weapon or the LAV pintle mounted 7.62 mm machine gun be fired while dismounted infantry are forward of the firing line.

3. Training Facilities. The following ranges and range training areas have targetry or are designed for the various weapon systems.

(a) Tanks

- (1) Range 101 - sub-cal range
- (2) Range 500 - Can conduct up to table 8 on this range
- (3) Emerson Lake RTA - numerous targets that provide up to table 12
- (4) Numerous areas located throughout MCAGCC for armor training

(b) LAV's

- (1) Range 101 - sub-cal range
- (2) Range 109 - Light anti-armor range
- (3) Range 113 - Multipurpose machine gun range
- (4) Range 500
- (5) America Mine RTA (only location at MCAGCC to fire HEI-T)
- (6) Numerous areas located throughout MCAGCC for training

(c) AAV's

- (1) Range 109 50 cal and MK-19 (B-576 ammo only)
- (2) Range 110 MK-19 HEDP, B-584 AND B-576
- (3) Various RTA's throughout MCAGCC

4. Stinger Guided Missile

a. Firing conditions.

(1) The entire Stinger guided missile SDZ (Figures O-1 and O-2) will be cleared of all personnel except those actively engaged in the missile firing. This number will be held to the minimum compatible with efficient operations.

(2) Stinger weapon systems will not be fired over the heads of unprotected personnel due to the hazards from launch motor impact and the sustainer motor plume.

(3) All training firings shall be limited to a maximum elevation angle of 50 degrees (40 degrees target elevation angle plus 10 degrees super elevation) to minimize the possibility of a malfunctioning missile traveling to the rear of the launch position.

(4) Procedures and precautions in appropriate technical and field manuals will be followed during Stinger firings. No firings will be made on directly incoming targets which normally pass over the launch area allowing targets or target debris to impact in the area upon intercept. Instructors and any other personnel exposed to the rocket motor will wear personal protective equipment as required for the gunner in the appropriate technical manuals.

b. Surface Danger Zone (SDZ)

(1) Stinger guided missile SDZ requirements apply to both air to air and ground to air launched missiles. This SDZ, based upon maximum ballistic range of the missile, consists of an impact area and areas A, B, and F. Self destruct features designed to terminate missile flight within the SDZ were not considered in establishing range safety requirements. Maximum ballistic range (Distance X) for Stinger in each launch mode is given below:

(a) Ground to air guided missiles

1 - Basic Stinger -11,900 meters

2 - Reprogramable Micro Processor (RMP) Stinger 13,000 meters

3 - RMP Block 1 Stinger -14,000 meters

(b) Air to air guided missiles - Same as ground to air except distance X increases two feet for every foot of altitude AGL at time of launch.

(2) Impact areas will normally contain fragments and debris and impact of missiles which are launched within its sector of fire. The sector of fire is that portion of the impact area in which targets may be engaged. The boundaries of the sector will be designated by positioning azimuth limit markers forward of the launcher position. All firings must be accomplished within these limit markers. The impact area for moving targets consists of an area 45 degrees to each side of the sector of fire and extending downrange to the maximum ballistic range of the missile. For stationary (hovering) and directly inbound or outbound moving targets the impact area may be reduced to 40 degrees.

(3) Area A is the lateral secondary danger zone which is adequate to contain the effects of warheads functioning at the edge of the impact area.

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It consists of areas 50 meters wide on each side of the impact area and extending downrange to the maximum ballistic range capability of the missile.

(4) Area B is the far secondary danger zone which is adequate to contain the effects of a warhead functioning at the forward edge of the impact area. It consists of an area 100 meters in depth beyond the impact area and area A.

(5) Area F is the launcher danger zone extending to the rear of the firing position. It is further divided into a primary danger area and two caution areas.

(a) Primary - 50 meters radius with boundaries which lie along rearward extensions of the impact area boundaries. Personnel are not permitted in the area during firings.

(b) Caution Area 1 also has a radius of 50 meters. Its boundaries are the primary launcher danger area and the impact area. Any personnel in this area must be protected from hazardous noise levels and flying ground debris.

(c) Caution Area 2 extends to the rear of the launcher with a radius of 125 meters. Its boundaries are straight lines drawn between the rearward extension of the impact area boundaries and the intersection of the 125 meter radius. Personnel in this area are exposed to hazardous noise levels only.

5. Surface Danger Zone (SDZ's) Diagrams

(a) LAV's - Figures O-3 and O-5 are used to construct SDZ's for main gun.

(b) Tanks - Figures O-4 and O-5 are used to construct SDZ's for main gun.

(c) AAV's - Figures N-3, N-4, and N-9 are used to construct SDZ's for Upgun system.

6. Caliber .50 Sabot Light Armor Penetrator (SLAP)

a. Figure O-6 depicts SDZ for the .50 caliber SLAP M903 and SLAP-T M962 ammunition.

b. Figure O-7 depicts criteria for developing SDZ's for the M903 and M962 rounds.

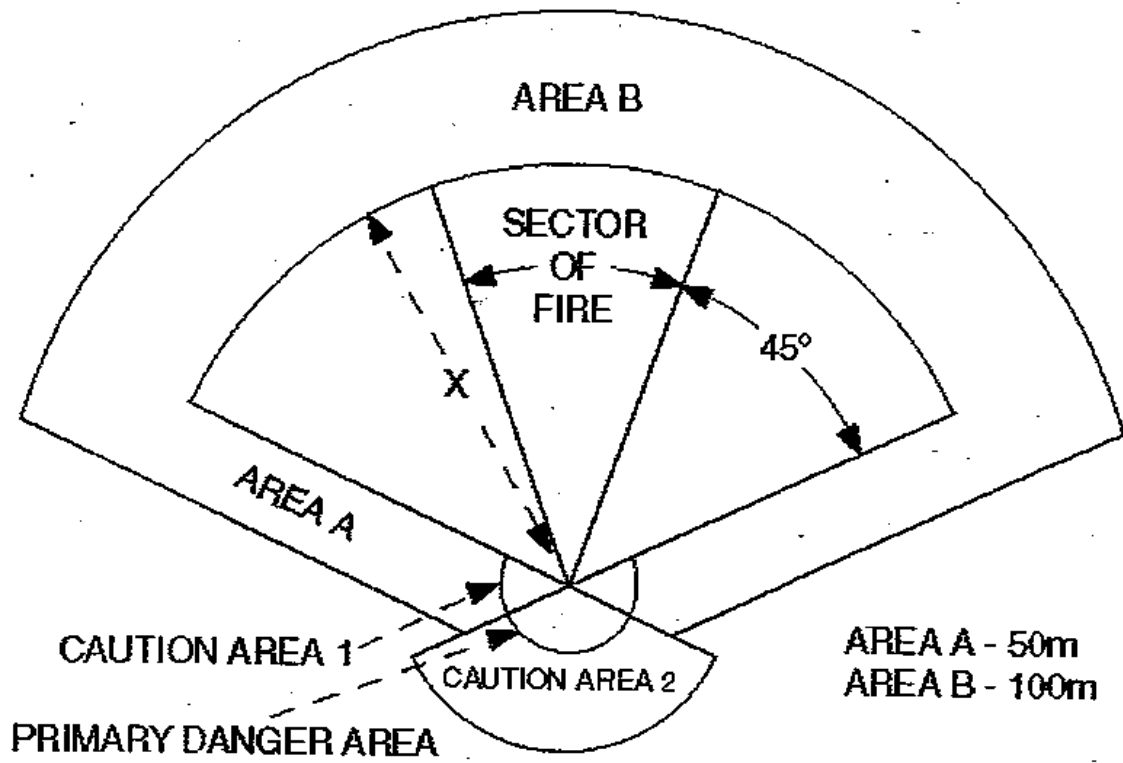


Figure O-1, SDZ for Stinger Missile

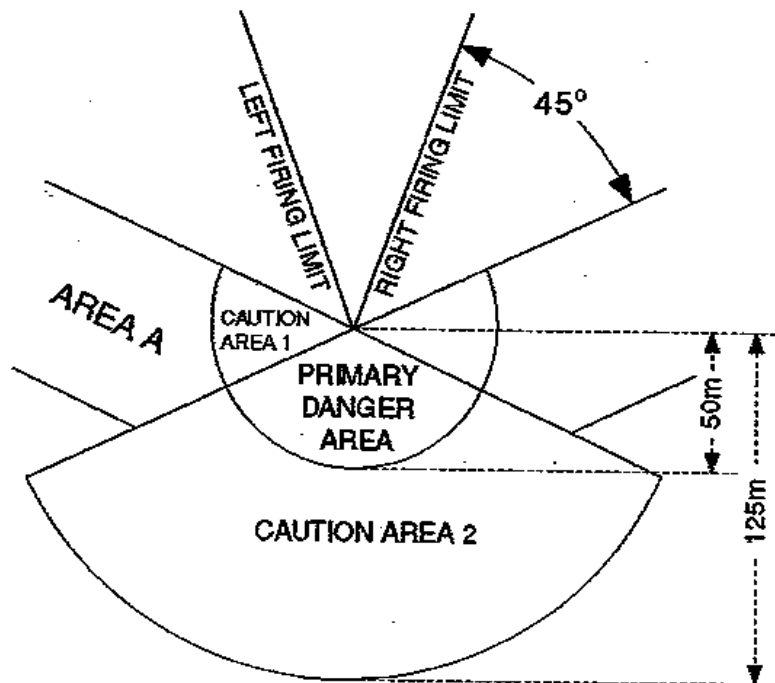


Figure O-2, SDZ for Stinger Back blast

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M791 (APDS-T)

Impact Medium	Area A (meters)	Area B (meters)	Area W (meters)	Angle P (Degrees)	Distance X (meters) ³	Ricochet Range (m)	15* Elev. Range (m)
Armor	N/A	N/A	1,510	24	14,572	7,294	11,550
Concrete	N/A	N/A	2,208	34	14,572	7,622	11,550
Earth	N/A	N/A	1,466	18	14,572	7,402	11,550
Water	N/A	N/A	263	6	14,572	5,665	11,550

M792 (HEI-T)

Impact Medium	Area A (meters)	Area B (meters)	Area W (meters)	Angle P (Degrees)	Distance X 3 (Meters)	Ricochet Range (m)	15* Elev. Range (m)
Armor	300	400	1,373	28	6,379	5,265	5,241
Concrete	300	400	1,290	27	6,379	5,071	5,241
Earth	300	400	908	19	6,379	4,79	5,241
Water	300	400	1,047	19	6,379	4,823	5,241

M793 (TP-T)

Impact Medium	Area A (meters)	Area B (meters)	Area W (meters)	Angle P (degrees)	Distance X (meters)	Ricochet Range (m)	15* Elev. Range (m)
Armor	N/A	N/A	1,373	28	6,047	5,266	5,112
Concrete	N/A	N/A	1,290	27	6,047	5,071	5,112
Earth	N/A	N/A	908	19	6,047	4,792	5,112
Water	N/A	N/A	1,047	19	6,047	4,823	5,112

M910 (TPCSDS-T)

Impact Medium	Area A (meters)	Area B (meters)	Area W (meters)	Angle P (degrees)	Distance X (meter)	Ricochet Range (m)	15* Elev. Range (m)
Armor	N/A	N/A	799	20	6,404	4,472	6,017
Concrete	N/A	N/A	1,143	27	6,404	4,643	6,017
Earth	N/A	N/A	734	15	6,404	4,592	6,017
Water	N/A	N/A	148	4	6,404	3,724	6,017

Wartime Only

Impact Medium	Area A (meters)	Area B (meters)	Area W (meters)	Angle P (degrees)	Distance X (meters)	Ricochet Range (m)	15* Elev. Range (m)
Armor	N/A	N/A	1,289	25	18,480	7,867	14,816
Concrete	N/A	NA	1,289	25	18,480	7,867	14,816
Earth	N/A	N/A	801	21	18,480	7,725	14,816
Water	N/A	N/A	801	21	18,480	7,725	14,816

Figure O-3,-- SDZ Criteria for 25mm Chaingun

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Notes: (25mm cannon)

1. Area A and Area B are not applicable (N/A) for M791, (APDS-T), M793 (TP-T), M910 (TPCSDS-T) or M919 (APFSDS-T) cartridges.
2. When firing at aerial targets and the gun elevation is greater than 15 degrees, the ricochet area as defined by Area W and Angle P is not required.
3. Distance X (Maximum range) may be reduced to ricochet range when engaging ground targets at ranges up to 3500 meters from stationary firing positions. When firing from a moving vehicle over level terrain at ground targets up to 3500 meters use the 15 degree elevation range. When firing on the move over rough terrain, use Distance X.

120 mm Tank Main Gun

Cartridge Type	Impact Media (1)	Distance X at 10* (2) (meters)	Ricochet Angle P (3) (degrees)	Maximum Deflection W(meters)	Area A (meters) (4)	Area B (meters) (4)
M829 (5) APFSDS-T	Earth Steel	29,392 29,392	11 16	1,070 1,400	NR NR	NR NR
M830 HEAT-MP-T	Earth Steel	6,589 6,589	17 12	1,080 600	1,125 1,125	1,125 1,125
M831 HEAT-TP-T	Earth Steel	6,589 6,589	17 12	1,080 600	NR NR	NR NR
M865 TPCSDS-T	Earth Steel	7,234 7,234	12 16	450 1,400	NR NR	NR NR

NOTES:

1. When engaging armor targets, recommend using earth impact media. In those cases where earth impact values are larger than due to the possibility of missing the target.
2. The elevation of fire from the firing position to the target will not exceed 5 degrees.
3. Maximum deflection is maximum horizontal ricochet distance from the left and right limits of the dispersion angle.
4. Practice ammunition with inert warheads and kinetic energy projectiles do not require (NR) an Area A since the ricochet area will contain all possible fragments out to the final rest position, or an Area B since the total range is expected to contain ricocheting projectiles down range.
5. Ammunition is a wartime round. SDZ is advisory only. Projectile contains depleted uranium.

Figure O-4,--SDZ Criteria for M1A1 Main gun

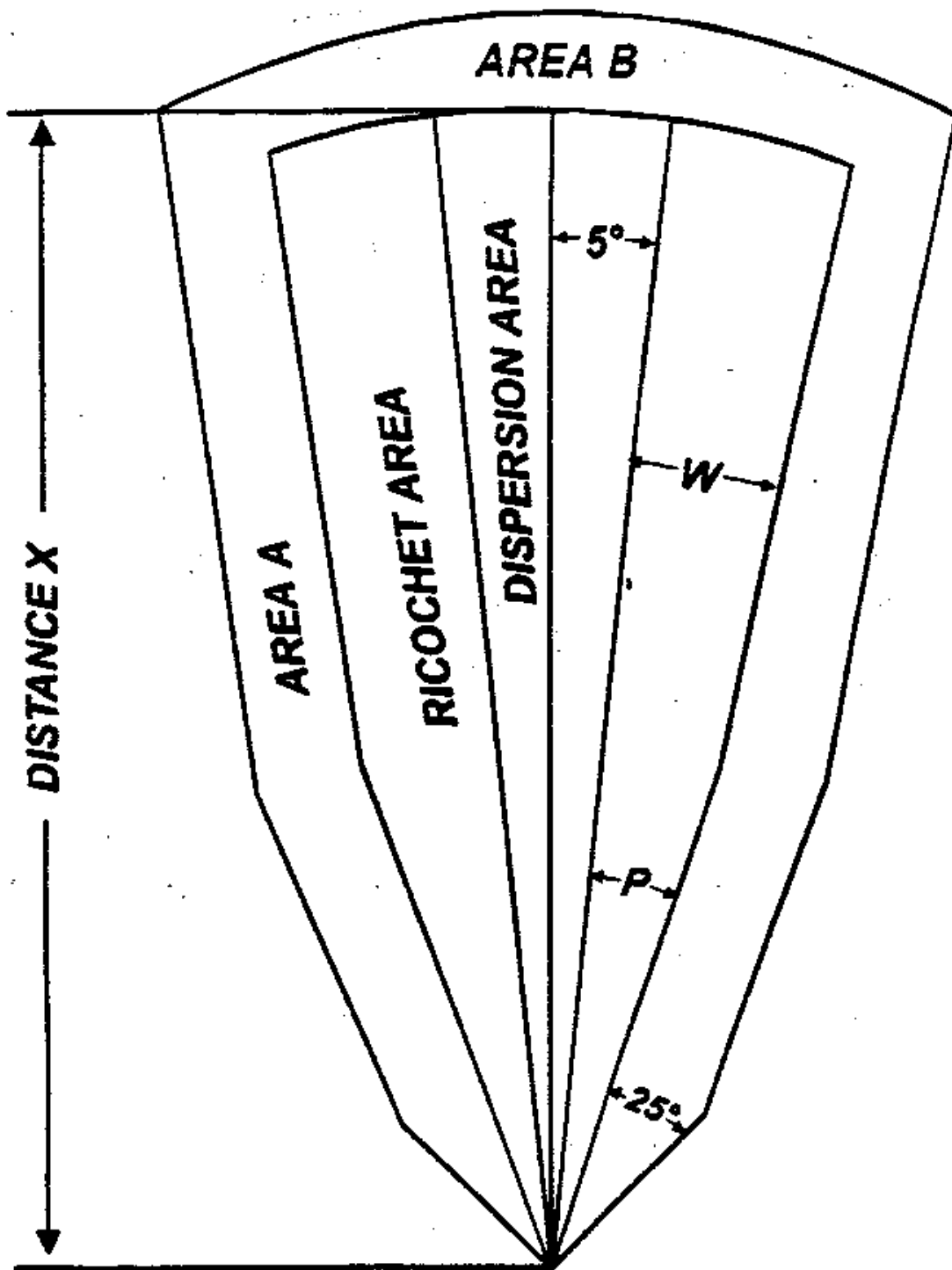
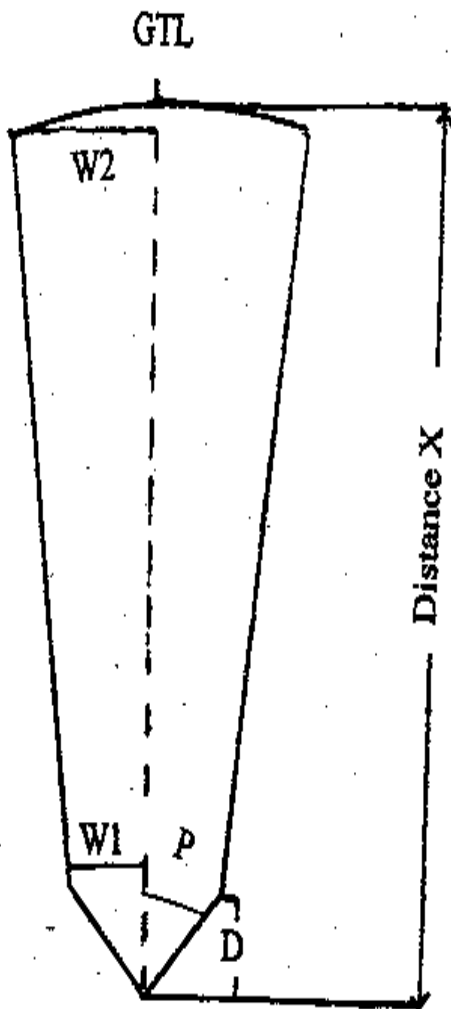
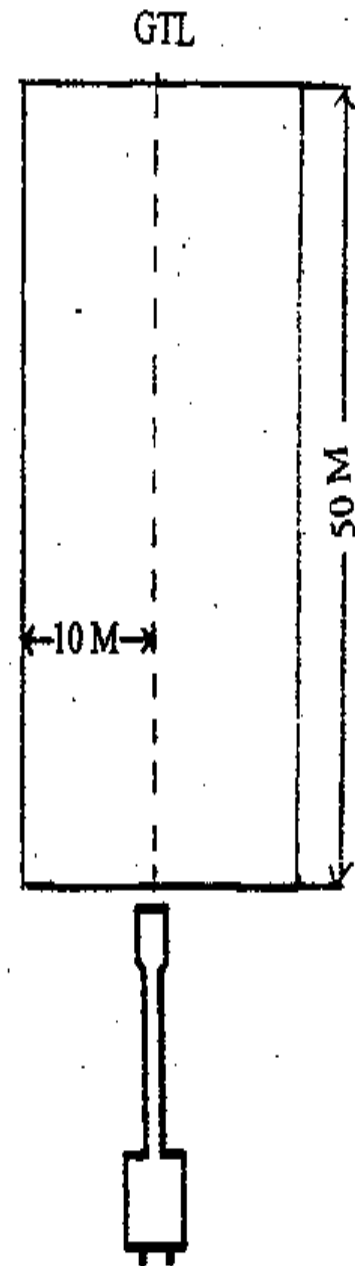


Figure O-5,--SDZ Diagram for 25mm and 120mm cannons



SDZ for Cal 50 SLAP M903
and SLAP-T M962



SDZ for Cal 50 SLAP M903
and SLAP-T M962 sabot discard
hazard area

Figure O-6,--SDZ For 50 cal SLAP and SLAP-T

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Altitude (Ft MSL)	Angle P (Degrees)	Distance X (Meters)	Distance D (Meters)	Area W-1 (Meters)	Area W-2 (Meters)
0	47.34	8,700	728	790	1,130
1,000	47.34	8,960	746	810	1,155
2,000	47.37	9,220	764	830	1,180
3,000	47.39	9,480	782	850	1,205
4,000	47.4	9,745	800	870	1,230
5,000	47.41	10,005	818	890	1,255
6,000	47.43	10,265	836	910	1,280
7,000	47.44	10,525	854	930	1,305

Surface Danger Zone Criteria

Cal. 50, Sabot Light Armor Penetrator (SLAP) M903
(Sand and Steel Media)

Altitude (Ft MSL)	Angle P (Degrees)	Distance X (Meters)	Distance D (Meters)	Area W-1 (Meters)	Area W-2 (Meters)
0	48	9,640	670	744	1,240
1,000	48	9,950	686	762	1,270
2,000	48.01	10,265	702	780	1,300
3,000	48.02	10,575	718	798	1,330
4,000	48.03	11,885	734	816	1,360
5,000	48.04	11,200	750	834	1,390
6,000	48.04	11,510	766	852	1,420
7,000	48.05	11,820	782	870	1,450

Surface Danger Zone Criteria

Cal .50 Sabot Light Armor Penetrator-Tracer (SLAP-T) M962
(Sand and Steel Media)

Altitude (Ft MSL)	Angle P (Degrees)	Distance X (Meters)	Distance D (Meters)	Area W-1 (Meters)	Area W-2 (Meters)
0	49.475	7,955	530	620	1,075
1,000	50.257	8,104	528	635	1,100
2,000	51.019	8,325	526	650	1,125
3,000	51.763	8,515	524	665	1,150
4,000	52.488	8,700	522	680	1,175
5,000	53.196	8,885	520	695	1,200
6,000	53.886	9,075	518	710	1,225
7,000	54.56	9,260	516	725	1,250

Surface Danger Zone Criteria

Cal. 50, MK211
(Sand and Steel)

Figure O-7,--Criteria for 50 cal SLAP, SLAP-T, and MK-211 SDZs

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